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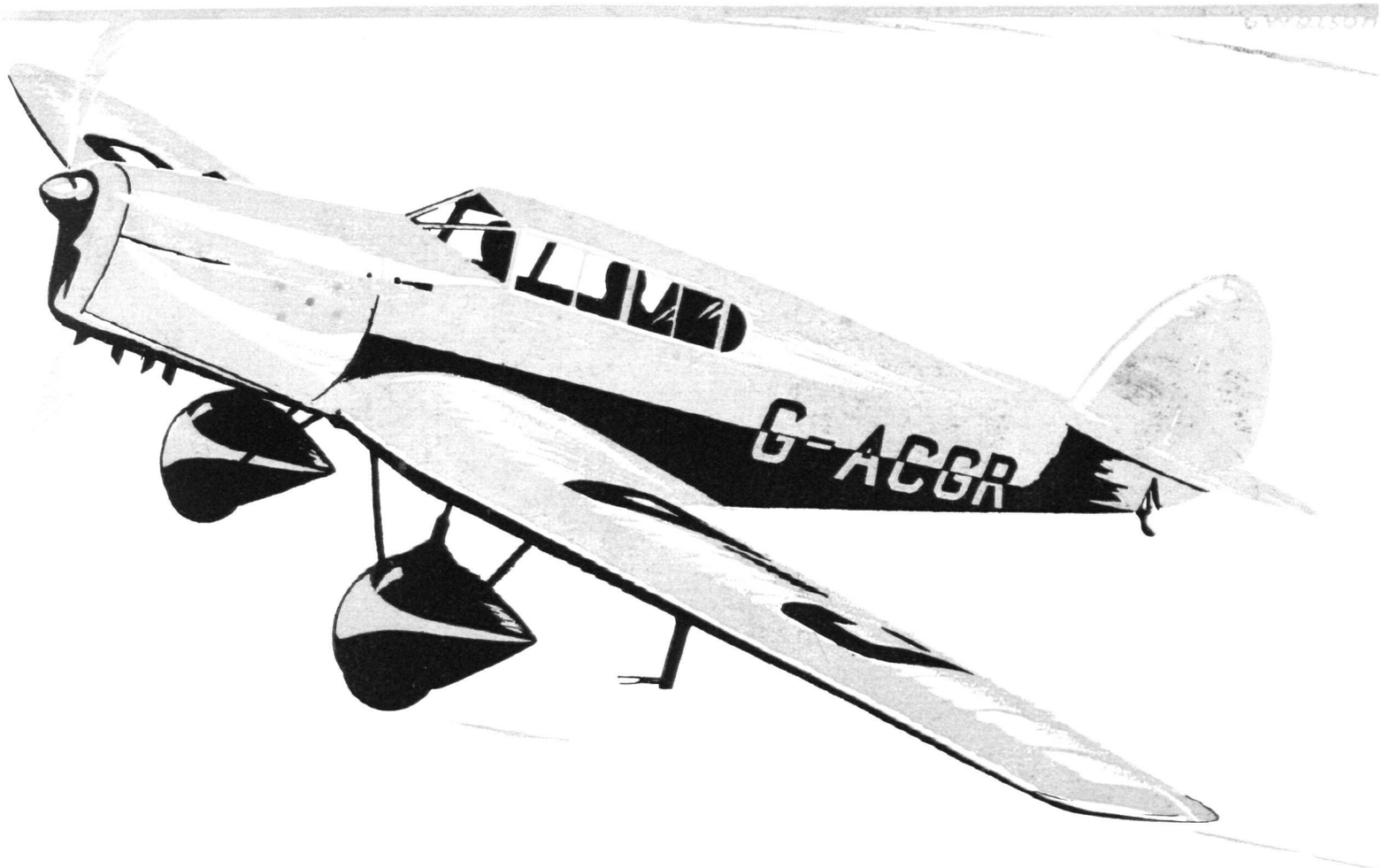

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport

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Aug. 31-Sept. 9. **Model Engineer Exhibition, Rl. Horticultural Hall, Westminster.**
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Sept. 2. **Norfolk and Norwich Ae.C. Garden Party.**
Sept. 2-4. **Austrian Ae.C. International Air Rally, Gastein, Austrian Alps.**
Sept. 3. **Maidstone Ae.C. "At Home."**
Sept. 6. **Isle of Wight Air Race.**
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1934.
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EDITORIAL COMMENT

FROM time to time an agitation arises about the alleged lack of support given to air mails by the British General Post Office. Such allegations are easy to make. They provoke an enthusiastic "Hear, hear!" from all who are actively interested in aeronautics, while the public will either echo the sounds of approval or greet the remark with hisses, according to whether the listener is pro-aircraft or anti-aircraft in sentiment. To form a just opinion one should indulge in a little analysis of the elements of the question.

Air Mails and the G.P.O.

If a debater is actively interested in air transport and takes the view that Aeronautics is a great god whom it is the duty of everyone to worship and serve, he will certainly be applauded by his co-religionists, but his dogma will leave the thinking layman cold. It is mere dogma, and there is no argument in it. In these critical days everyone demands that a creed must be supported by argument. FLIGHT, because it is FLIGHT, is a devotee of the aeronautical cult; but it is no bigot. It urges the use of aircraft when and where it will be of advantage to mankind. It holds, if we may misquote Scripture with no irreverent intention, that aircraft was made for man, not man for aircraft. To argue otherwise is to invite the scorn of the agnostics. Converts will never be made by such missionary tactics.

We must then admit that the first duty of the General Post Office is, not to encourage and subsidise air services, but to provide the best possible mail transport for the public. Then, of course, one has to define the meaning to be given to the word "best." It does not of necessity mean the cheapest or the most expensive or the fastest or the slowest sort of transport. In defining the word all sorts of considerations, some temporary, some permanent, some local, some national, etc., have to be taken into consideration. If air transport in any given circumstances fulfils the requirements of the "best" form of air transport, then it is the undoubted duty of the General Post Office to send its letters by air.

In the early post-war days an Air Conference was held every year at the Guildhall, which was always attended by Brig. Gen. Williamson on behalf of the G.P.O. In all his speeches at those conferences the gist was this—: "Aircraft may fly faster than trains and steamers can move, but they are not yet reliable; achieve reliability, and then come and talk to us." It was made perfectly clear that a slower, reliable, mail service was considered by the G.P.O. far preferable to a faster, erratic service, and this attitude was doubtless the result of long experience of the needs of the business community. Suggestions that the G.P.O. should help air transport were lightly waived aside, with the remark that air mail subsidies were the affair of the Air Ministry. The G.P.O. could only consider the interests of its own clients, the letter-writing public. It is very difficult to find any fault with that attitude of the G.P.O.

The position now is different. Air transport was then not entirely reliable. Now, thanks to technical advances, it ought to be as reliable as any other form of transport. If a mail aeroplane does not arrive up to time in these days, one may fairly conclude that something is wrong with the organisation. It may not be the fault of the pilot or the ground staff on the aerodromes, but still something is wrong which ought to be put right. Perhaps a new route has been opened before the aircraft specially designed to work that route are ready, and it may have been held better policy to take a risk and open the service than to wait for the delivery. In that case the flying company may have done the best in the circumstances, but still something is wrong. Our contention is that at the present stage of development air transport ought to be able to offer the G.P.O. the reliability which it has always demanded. The operators ought to be willing to sign an agreement containing a strict penalty clause to deal with cases of late arrival. In that case, it does seem to be time for the G.P.O. to make far more use of the air mail than it has done in the past.

There are various ways in which the G.P.O. can patronise the air mail. At present it leaves to the letter-writing public the decision as to whether a letter shall go by air mail or not. That is not done in all countries. Another system is for the Post Office to take the responsibility itself of deciding whether the mail is to go by air or otherwise, without additional charge to the correspondents. In that case the G.P.O. bears the extra cost, which means that public money is used to pay a form of subsidy to the air transport company. It is paid for definite services rendered, and for that the system is to be approved. In that case there should be no need for a direct subsidy from any other Department of Government. Our British G.P.O. is a profitable concern, and of late in these days of financial stringency the Government has warmly welcomed its profits as a useful contribution to the revenue of the year. Well, of course, we have to pay our way, and if the money cannot be found in one way, then it must be found in another, and then perhaps the income tax might go up another 6d. or so.

Even in these days, however, it behoves Government Departments to look ahead. If it is apparent, as some believe, that our future interests and profits are being risked by lack of support now for our air services, it would seem to be the duty of the G.P.O. to take the lead in demanding the right to give those services a helping hand out of its annual surplus. To do so would be helping the public, the letter-writing public, which we commenced by saying was the first duty of the G.P.O. The assistance to the flying companies would be merely a means to a public end, not a bowing down in the house of the great god Aeronautics.

It is a recognised principle of the Government (in fact of all our Governments for a good many years past) that at least one flying company must be helped out of public funds. We can hardly complain if that assistance comes only out of one set of Estimates, the Air Estimates, and not out of two. It seems reasonable now to inquire whether the time is not approaching, or even if it has not already come, for the Post Office to take over from the Air Ministry the duty of assisting air transport. Of course, it would have to be expected that the agreement would be inspired more by a businesslike concern for the public interests and less by sympathy for aircraft than the old arrangements have been, but the time has either come or is soon coming when such an arrangement should be welcome to air transport companies. An air mail contract, even including a stringent penalty clause, should be a very profitable affair. Such mail contracts have been the rule in the United States and Canada. The Dutch East Indies service has also worked on that basis and has been very well satisfied with it. On that service the Post Office pays for 500 kg. of mail matter to be carried on each trip. If less than that weight is forthcoming, then the Post Office bears the loss. Above the 500 kg. the Post Office begins to make a profit. The latter therefore has every inducement to advertise the air mail and to persuade the public to use it. The public still decides whether each letter is to go by air or not. An improvement on that would be for all first-class mail matter to be sent by air at the cost of the G.P.O. without further reference to the public, as a substitute for the unpopular subsidy system now in force in this country. We understand that the Australian Government intends to subsidise the Singapore-Australia service on a mail basis only, passenger accommodation being provided at the contractor's own risk. This should give useful experience to guide us in our future policy.

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R.A.F.O. Training

Very good accounts have reached us about the new programme for training the Reserve of Air Force Officers which came into force last April. Each officer now does 20 hours' flying p.a. instead of 12, which is a great improvement, and does them on very good types of light aeroplane, the "Cadet," "Tiger Moth," Blackburn B2, and "Cutty Sark." The chief improvement, however, is that mere aimless putting in of flying time has been abolished, and now every flight has a definite object, cross-country, photography, bombing the camera obscura, instrument-flying, and such like. The course has now become much more interesting to the Reserve officers and the instructors alike, and the Reservists are kept in much better form as pilots who can take their places in squadrons in a time of emergency.

THE "DEUTSCHLAND FLUG" 1933

By EDWIN P. A. HEINZE

ONCE again practical experience has overthrown all theory. In last week's issue of FLIGHT we reported on the very carefully thought out and very interesting regulations for the "Deutschland Flug." We described how a short high-speed test preceding the air tour was to supply results to be used as a criterion for the classification of the light planes in the further contest. But on Thursday morning the rain poured down monotonously hour by hour. Although this could not quench the high spirits of the competitors, it caused a considerable delay, because the organisers wanted to await better weather, which had been predicted. As this was very slow in coming, a start had to be made at all costs, which gravely affected the results of the high-speed test, because several hours were required to carry this through, so that the first machines were handicapped by the still continuing bad weather, while the later machines benefited by a very marked improvement of weather setting in towards noon.

Of the 150 machines entered, 25 did not turn up for the weigh-in. Most of these could not be got ready in time. A great many of the competing machines were old club planes, and on most of these adjustments or repairs of some kind or other were necessary. All the workshops on the Tempelhof Airport in Berlin were busy day and night for a week. Among those that did not start was the only "Autogiro" that had been entered, which was noted with general regret.

The high-speed test was held at the Berlin-Staaken aerodrome, as there the machines could start and land without impeding other air traffic. So on the Thursday morning all 125 machines lined up in Tempelhof to fly across to Staaken, some 12 miles west, returning to Tempelhof after the speed test, for which each machine started individually, followed 30 sec. later by the next. As, owing to the circumstances mentioned, the first machines, handicapped by the low rain clouds and bad vision, would mostly have come into a class for the further contest, into which they rightly did not belong (some of them had gone astray and attained very low average speeds), the organisers decided to permit the competitors to have their machines classified not by these high-speed test results, but by their recorded type test speeds. Thus, the well thought-out plan came to nought. All competitors availed themselves of this permission, which, however, did not affect the rating, that is, the number of points gained in the high-speed test.

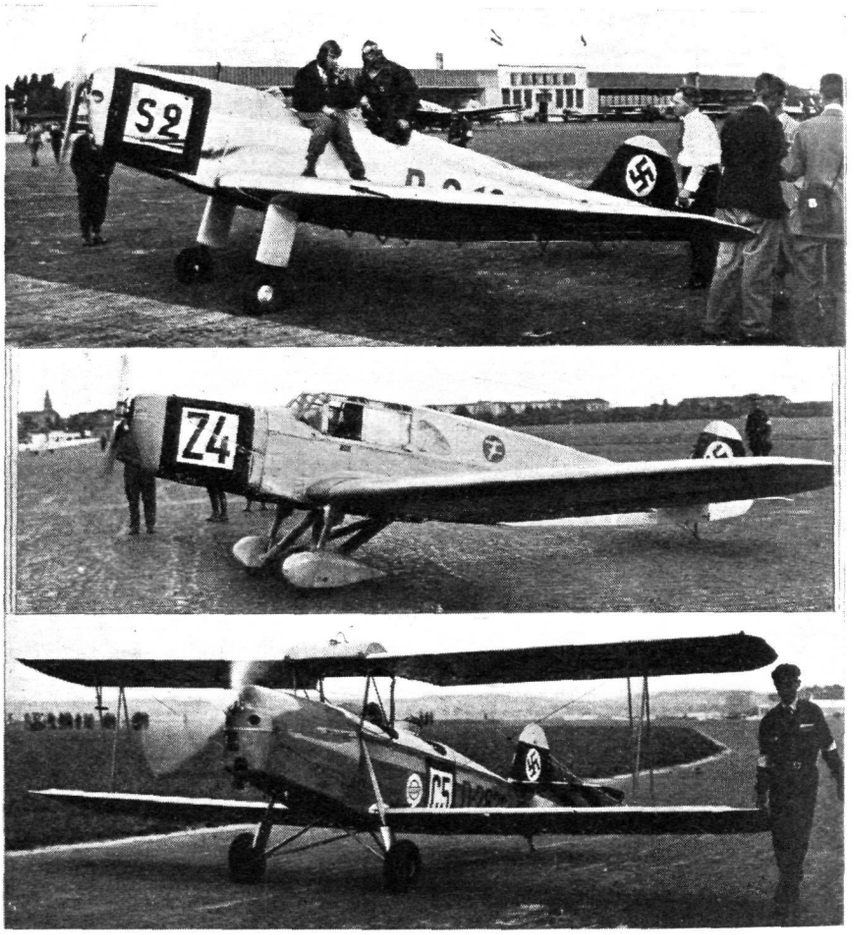
As was already pointed out in last week's report, this competition attracted equally the old well-known pilots of great experience and the youngsters. We find all the well-known names in the list of competitors, such as Wolf Hirth, Fieseler, Osterkamp, Poss, Seidemann, Aichele, Siebel, Junck, Thelen, Seyffer, to mention a few of the old brigade at random. Even the famous old Do.X captain, Christiansen, who now holds a very high office in the German Air Ministry (anything but an austere official personage), took part in a Klemm in manifestly high spirits, a true comrade to all. And amongst these veterans the innumerable "young ones," full of hope and determination to give the elders a fight for their life, gave the event a character all its own. Good humour, discipline, comradeship and an excellent organisation could not fail to make this competition the complete success it deserved to become in view of the most painstaking preparations that had been made for it in all parts of the country.

Turning from the men to the material, one found the predominating position of the Klemm works confirmed once again. No fewer than 83 out of the 125 machines were Klemms of all types. Messerschmitt is making headway again, and one found 21 light planes of this make. Also Fieseler is coming to the fore. He is the German aerobatics champion, and though by profession something quite different to an aeroplane constructor, he took such fancy to aeroplane designing and building that about two years ago he started out in this line, building at Kassel sailplanes and light motor machines. Last year he came out with a popular-priced monoplane, and has followed this up with a very neat new model, of which seven took part in this contest. It is a low-wing monoplane with steel tube fuselage and wooden wings. It has two tandem seats and is equipped with a Hirth HM.60 engine giving 70 h.p., with which a maximum speed of 210 km./hr. (130 m.p.h.) is attainable. Heinkel is represented by a single machine of the type used last year in the European Light Plane Contest, and this machine is in the hands of Lt. Seidemann, who last year made such a spectacular dash through Europe on it. But Heinkel has also recently brought out a new school biplane, which took part in the Deutschland Flug with the Heinkel chief pilot Junck in command. This is a straightforward design and rather robust, with few of the aerodynamical refinements of other recent Heinkel products. Biplanes are not popular in Germany. Two elderly Focke-Wulf "Kiebietz" biplanes, two Gerners, two old Raab-Katzenstein "Schwalbes," two Arado, one Udet "Flamingo," and the well-known cantilever Darmstadt High School machine, were the only other biplanes in the contest, in which also two Junkers "Junior" all-metal machines took part.

"LOW-WINGITIS": Design in Germany appears to have become stereotyped, as indicated by this group of machines ready for the "Deutschland Flug," 1933.

It is remarkable how German aeroplane design tends to become petrified. The low-wing monoplane dominates all designers' minds. This type of machine, of course, has its great virtues and merits. But what has become of those apparently so promising tailless machines? And why is there so very little interest, say, for instance, in the "Autogiro"?

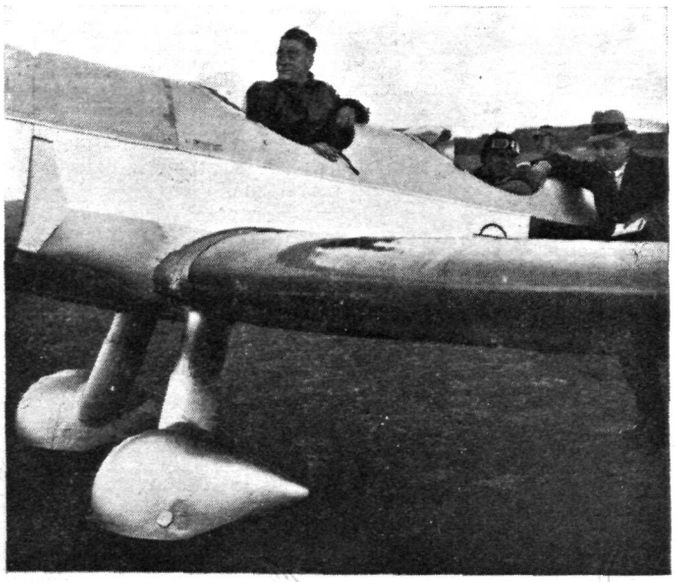
The German engine makers, a fact noted already last year, have caught up the lead once held by makers in other countries in the construction of engines suitable for light planes. The radial Siemens & Halske engines have become very popular in Germany. No less than 44 machines taking part in the "Deutschland Flug" this year had engines of this make, with outputs from 80 to 160 b.h.p. Next in popularity is the inverted four-cylinder Argus AS.8, which has an excellent record. It delivers 110/120 h.p., but the very latest improvements give it an output of 135 h.p. at 2,200 r.p.m. The Argus was fitted on 41 machines. Wholly remarkable is the way Hirth engines, a very young make, have zoomed into



SOME COMPETITORS: At the top, Kurt Bley on the Fieseler 5. In the centre, a Klemm Kl.32, piloted by Ministerialrat Christiansen, formerly skipper of the Do.X. Bottom, one of the few biplanes, the Gerner.

popularity. The HM.60 model, with four inverted cast-iron cylinders and coil ignition, has an output of 65/70 b.h.p., and was to be found on 36 machines. The Bayerische Motoren-Werke are making a bid for the same market with their new BMW-X, a radial delivering 54/60 b.h.p., which has just gone into production. Three machines had this motor, which looks back upon four years of development work and has a very good type test record, as during the entire 100 hours' test not a single part had to be replaced and not the least trouble of any kind was experienced. Veteran engines, an old Mercedes and a Siemens Sh.11, no longer in production, were also to be met with, the latter on one of the two Focke-Wulf biplanes, the former on a Klemm.

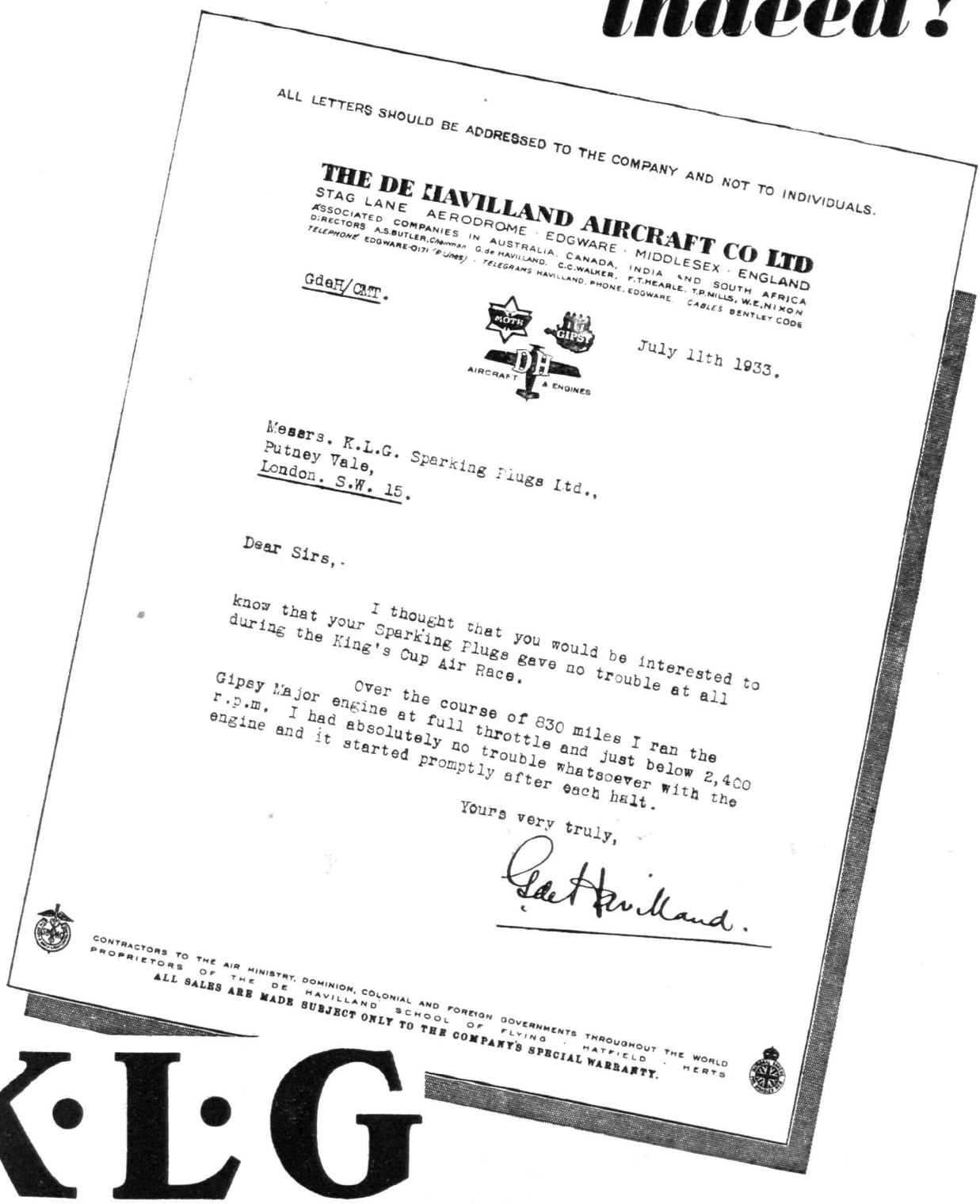
The results of the high-speed test are to be regarded as very satisfactory in view of the circumstances, for no less than 48 competitors managed to attain 60 and more points, which means that all these pilots were able to attain an average speed over the 50-km. distance under adverse weather conditions a speed as high as, and in some cases far higher than, the maximum speed of the type of machine recorded in the type test flights. These results were achieved by no means exclusively by highly experienced men with factory support behind them, but in the overwhelming majority by just normal clubmen amateurs, who with their club comrades had spent many an hour in fairing and streamlining projecting parts and otherwise improving the aerodynamical properties of their craft. In fact, quite a number of the "cracks" lost very heavily. Aichele, a pilot of the very best class, only achieved 44 points, Martens none, von Dungern 6, Junck 44. In justice it must be said, however, that some of these very first men had machines already so very refined that improvement in their performance beyond the type test figures was well nigh impossible. The other pilots frequently had old crocks with low type test speed figures that admitted of considerable improvements being effected. This is another little point the regulations really failed in meeting satisfactorily. Four machines, the Klemms of Karl Schwabe, Dietrich and Eugen Kopp, and the Messerschmitt of Dr. Zinner, all barring Kopp's machine having Siemens & Halske Sh.13 engines of 80 to 88 h.p. output, actually succeeded in gaining the full 100 points, so that they had reached an average speed 10 per cent. higher than the maximum type test speed. Kopp's machine had an Argus As.8 engine.



AN OLD TIMER: Arthur Martens, who won fame in the early days as a "wizard" glider pilot, in his Messerschmitt M.27 b.

As already mentioned, all machines returned to Tempelhof airport for the night to be in readiness next morning at 6 o'clock for the first air tour. When Friday dawned the competitors awoke to a tempestuous day's work. The classification of the machines had been worked out during the night and resulted in four of them being allocated to class A, comprising the machines with a maximum speed no higher than 135 km./hr. (84 m.p.h.). Ninety-nine machines came into class B, the speed limit of which was 180 km./hr. (112 m.p.h.), and 22 made up class C, with higher maximum speeds. The route to be followed went from Berlin to Stettin, along the Baltic coast eastwards to Danzig, where class A had to turn back, while the other two classes continued eastwards to Königsberg. Thence they returned to Danzig and followed the same course as the class A machines pursued southwards to Frankfurt-Oder, where classes A and B turned west straight for Berlin, while class C went on south to Görlitz and then north-west to Berlin. The nearer the competitors approached the coast, the worse the weather became, and on this first day's tour, in which Lt. Seidemann in his Heinkel again excelled in regard to high-speed travel, achieving the highest recorded average speed of 207 km./hr. (128.5 m.p.h.) for the 1,500-km. distance, already 22 machines dropped out. At Danzig conditions appeared to be particularly bad, for there a whole batch of machines, some of them in really good hands, stood on their heads, broke or bent propellers or undercarriages and the like. Wolf Hirth experienced engine trouble and had to come down, almost within sight of Danzig, on an island. Fieseler just managed to reach Danzig and retired there, where also Hackbusch nose-dived his latest Messerschmitt model. In fact, the weather was so bad that for some time machines were forbidden to start. But also along other parts of the route machines came down. The worst experience had Schafke, who smashed his machine, a Klemm, completely at Frankfurt-Oder. Yet all these mishaps went off well for the occupants of the machines, of

Such praise is praise indeed!



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which after this day's tour now only 103 were left. Still the result is not at all bad considering the inexperience of so many pilots and that so many machines had their best days behind them.

The Saturday air tour required the fast machines of Class C to fly up north-west from Berlin to Wyk on the island of Föhr in the North Sea, and thence via Heide on the mainland coast south to Bremen, on to Münster and Düsseldorf, and north-east to Hannover, east to Magdeburg and north-east to Berlin. The B class machines went straight from Berlin to Bremen, down to Münster and Dusseldorf, the same course as the C class machines, while the A class also went to Bremen and on to Münster, but from there cut straight through via Hannover to Berlin. The weather in the early morning hours was passably good in Berlin, but in the west, especially round about Bremen, heavy fogs and mists were encountered, wholly obscuring vision. As the Siemens & Halske engine on Friebel's Messerschmitt was out of order, forcing him to retire, 102 competitors started out on this morning. Unhappily, a tragic accident threw a shadow on this event. About an hour after his start, Osterkamp returned to Berlin-Tempelhof in his Klemm and reported that Poss had crashed at Neustadt/Dosse, near Berlin, owing to striking a church spire with his left wing. Telegraphic news came through of Poss and his companion, Paul Weirisch, having been killed instantly by the impact of the machine on the ground. Osterkamp, an intimate friend of Poss, retired. Poss was one of the most experienced and highly-estimated pilots. In each of the three European light plane contests he secured second place. During the war Poss was a member of the German Marine Air Force, and made a name for himself by his successful reconnaissance flights. After the war he became a transport pilot, and was, together with Hermann Köhl, one of the first to carry through a regular night service from Warnemünde to Stockholm.

Seidemann, with his racing Heinkel, was again the first to return to Berlin from the tour. He arrived already at 2.20 p.m. The day again took toll of the competitors, of whom 82 arrived back at Berlin and remained in the contest. Engine defects were the cause of most emergency landings, which frequently led to damage of the machines. Behlend, in a Raab-Katzenstein biplane, tried to land behind Bremen in a fog, in which he had lost himself, and smashed his machine, without he or his companion being hurt. An unusual accident had Steitz with his "Argus"-engined Klemm. The propeller flew off and the engine support frame broke. The engine was then torn out and one of the two stay wires broken. He landed safely with the engine hanging in the air on the remaining wire. Also, Capt. Christiansen, leading a Klemm formation group, had to make an emergency landing after completing the greater part of the air tour. His trouble was a broken propeller. The machine was damaged.

Already during this second day the limelight of public interest began to focus on a group of five young pilots flying in close formation all the time in their Klemms with Siemens & Halske Sh 13a 5-cylinder radial engines of 75/88 h.p. These were Höfft, Köhnk, Roese, Dietrich and Beseler, of whom only the latter had any previous competition experience, as he had taken part in the Deutschland Flug of 1931. These five flew with clockwork regularity, maintaining throughout the necessary 85 per cent. of the known maximum speed of their machines to secure the full available 400 points. They each made their two night landings at Tempelhof in good style, gaining the full 100 points, and also effected the same optional landings. The leader of the group was Beseler, and he very manifestly flew with his head, taking no undue chances. He kept speed down so as just to gain the full points and prevented overstraining of the engines.

Enlightened by the Press, the general public began to realise that its hero, Seidemann, despite his truly fine performance (he was the first every day to return to Berlin in his racing Heinkel) was by no means to be a likely winner. According to the Saturday results he was in seventeenth position, despite the fact that he had flown every whit as well as all the others in front of him. He was badly handicapped by just that high turn of speed of his machine. During the high-speed test he was only able to average 107 per cent. of the known type test maximum speed of his machine. "Only" 107 per cent.! The others, using older machines with a low-rated type test maximum, had been able to improve them so much that most of them could average 110 per cent. and gain the full 100 points.

Sunday's tour was 800 kilometres long for the A class, 1,106 kilometres for the B and 1,359 kilometres for the C machines. The route went from Berlin down south into the mountainous regions, the fast C machines having to fly to Leipzig, Rudolstadt, Darmstadt, Mannheim, Stuttgart, Münich, Nüremberg, Dresden, and thence straight back to Berlin. The B class short-circuited this course from Mannheim across to Nüremberg, the A class from Rudolstadt to Nüremberg and there continued as Class C.

The weather all day, while somewhat boisterous in

REFLECTIONS ON THE "DEUTSCHLAND FLUG," 1933.

places, was on the whole satisfactory, and all 82 competitors passed Rudolstadt without mishap. Only in the morning hours were fogs encountered, especially around Rudolstadt, where for some time the airport had to be closed for this reason. One competitor entirely missed Rudolstadt and had to be disqualified. Behind this station began trouble for many competitors. Having lost time through the fog, many flew with fully open throttle, and engine failures caused emergency landings, some of them with damage to machines. Thus seven competitors were thrown out of the contest. Fortunately no one was hurt, and all remaining 74 machines arrived safely at Berlin-Tempelhof, the last four after fall of dark.

Also on Sunday the Beseler squad continued its splendid performance and, having flown the entire 3,283 kilometres of the B class together and having landed perfectly on all nine "emergency fields," gained almost the full available 1,000 points. The achievement is the more remarkable as normal club machines, by no means new, had been employed, and that amateur pilots attained this great success in competition with old and very experienced men.

Not only the Beseler squad was successful but also another squad of three students in Klemm machines, and a further squad of three engineers of the Deutsche Versuchsanstalt für Luftfahrt (the German approbation authority), who also piloted Klemms.

The squads as such could not receive awards, but their members, as mentioned, were awarded special points. The uniformity of the performances in the Beseler group is well illustrated by the fact that pilots Köhnk and Höfft both received exactly 995 points. The first prize had to be divided. In the event of a tie it was to be awarded to the pilot who gained the highest number of points in the high-speed test. If here the points were the same then the number of points gained by landings on the emergency fields were to be decisive, and finally those gained in the night landings were to decide. But in all three these two pilots had an equal number of points. Dietrich gained 993, Roese 991, Beseler 989 points. All five gained the full number of points in all but the high-speed test. Sixth man was Schif (Klemm-Argus) with 975 points, seventh R. Kopp (Klemm-Hirth) with 973 points and eighth Huppenbauer (Klemm-Sh 13a) with 971 points. Seidemann was fourteenth with 939 points, the well-known old Klemm pilot Siebel (Director of the Klemm Company) was 21st, Junck, the Heinkel chief pilot, with the new biplane, was 31st, and so on all the well-known names were low down in the list. It was an excellently organised and most instructive event—this "Deutschland Flug," 1933.

Air Transport

Survey Flight in Northern India

A SURVEY FLIGHT of 1,500 miles in Northern India has lately been completed by Capt. A. Riley, Chief Instructor of the Delhi Flying Club. The flight was done on behalf of Indian National Airways to investigate the possibilities of linking up the newly inaugurated Indian Trans-Continental Airways' service with the cities of North India. Two practical routes have been found: one from Karachi to Rawalpindi by way of Jacobabad, Multan, and Lahore; the other bifurcating from the Indian Trans-Continental Airways' route at Jodhpur, passing through Bikanir and Lahore to Rawalpindi; this latter route will require the approval of the Maharaja of Bikanir. The final choice of a route will rest mainly on commercial considerations rather than technical-flying advantages. From a purely flying point of view, according to Capt. Riley, the Jodhpur route is preferable for several reasons. The existence of an aerodrome which is one of the best in India; the fact that it is an established night stop on the Trans-Continental route; the convenience of a modern hotel within 300 yards of the aerodrome; the saving of time; and the existence of subsidiary landing grounds along the first part of the route.

Mr. Grant Govan's Visit

MR. GRANT GOVAN, the President of the Delhi Flying Club, has just paid a quick visit to England in connection with the negotiations for the trans-India Air Mail Service and its feeder lines. It is understood that the results of his visit are entirely satisfactory, and in future Mr. Grant Govan will be closely connected with not only the trans-India Air Mail Service, but also with the commercial air development of Northern India.

London-Plymouth Air Line

THE new service between London and Plymouth, operated by International Air Lines, was inaugurated by the Mayor of Portsmouth on Thursday, August 24. The Mayor, Alderman R. R. Coke, broke a bottle of champagne over the nose of one of the Company's monospars, which was thus christened *Sir Francis Drake*. International Air Lines will run three services daily from London to Plymouth and from Plymouth to London, leaving each terminus at 8.30 a.m., noon, and 5 p.m. The return fare will be £5.

Amsterdam-Hull Air Service

THE Royal Dutch Air Service (K.L.M.) is investigating the possibilities of opening a regular air service between Amsterdam and Hull. Probably Fokker "F XII" machines will be used.

Extension of Soviet Air Mail Line to Far East

THE recently opened air mail line, Botchkarevo-Khabarovsk, has now been extended to Vladivostok, to which a regular daily postal service by air is now being maintained. The total length of the new air mail line is 900 km.

Brazilian Air Mail

THE Brazilian Minister for Public Works has been authorised to contract for an air service between Pana, at the mouth of the Amazon, and Manaos, in the interior of Brazil. Such a service would bring these two towns within ten hours' journey instead of the five days it takes by steamer.

More Air Mail Pillar-Boxes

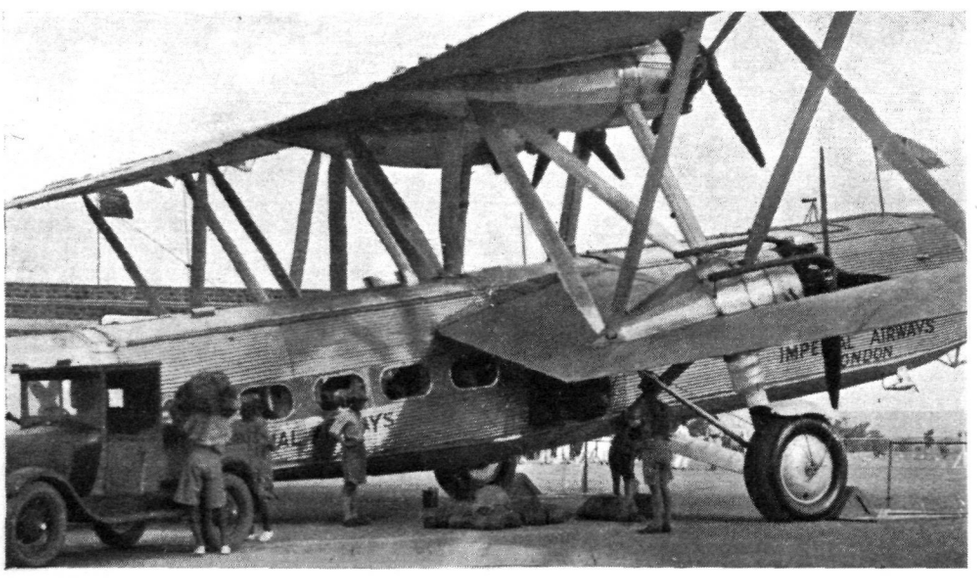
OWING to the increasing use of the Air Mail services, the G.P.O. has decided to erect a number of air mail pillar-boxes in the suburbs of London.

Portsmouth and Isle of Wight Service

THE number of passengers carried during the week ending August 24 was as follows:—

SPITHEAD AIR FERRY ..	between	Ryde and Portsmouth ..	571
SHOREHAM AIR FERRY ..	,,	Portsmouth and Shoreham	11
SHOREHAM AIR FERRY ..	,,	Shoreham and Isle of Wight	4
SHANKLIN AIR FERRY ..	,,	Portsmouth and Shanklin ..	23
SHANKLIN AIR FERRY ..	,,	Ryde and Shanklin	12

THE KARACHI-CALCUTTA AIR MAIL: The accompanying illustrations show incidents in connection with the first air mail service between Karachi and Calcutta, which was inaugurated on July 7. Our first picture (top, right) shows the Armstrong-Whitworth *Arethusa*, of Indian Trans-Continental Airways, unloading mails from Calcutta at Karachi on the homeward journey on July 12. These mails (635 lb.) were transferred to the Imperial Airways machine *Hanno* (bottom, left) for the remaining portion of the journey to Croydon. On the right is shown Mr. P. R. Pinhorn, Chairman of the Board of Directors of Indian Trans-Continental Airways.



THE P.W.S-54

A Polish High-Speed Commercial Aeroplane

IN March last, the I.B.T.L. (the Polish Aero Research Institute) completed, with satisfactory results, the flight testing of the P.W.S.54 plane, designed and built for the Polish Ministry of Communication by the Podlasian Aircraft Manufacturing Company of Warsaw.

This aeroplane is one of the fastest of commercial planes of this type built in Poland, and the performance attained with the Skoda-Wright J.5 220-h.p. engine equals the performance of many of the best planes of other nations. At the present time the P.W.S.54 is being tested by the Polish Airlines "Lot," where its serviceability may be proven to the utmost.

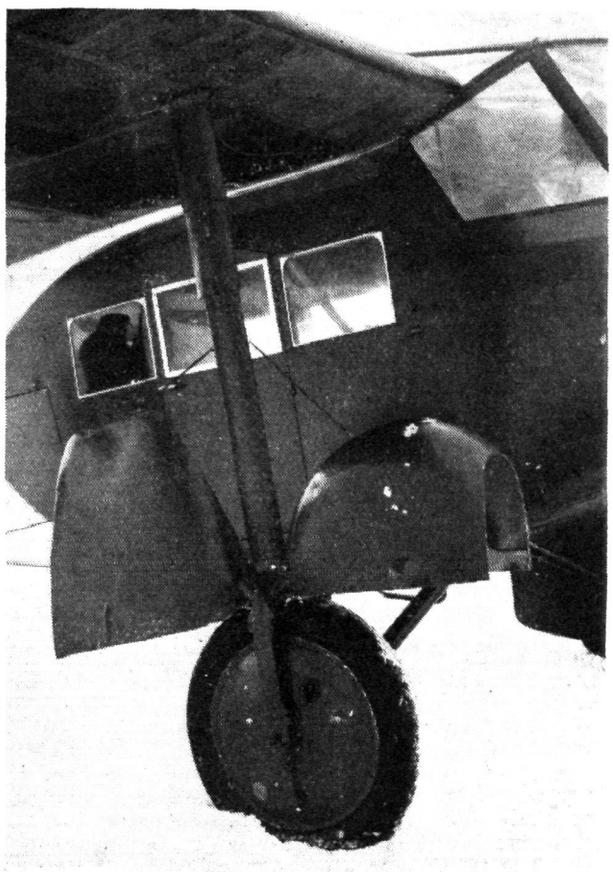
The P.W.S.54, succeeding the models P.W.S.20, 21 and 24, is the fourth commercial plane designed and completely manufactured by the Podlasian Aircraft Manufacturing Co. The good results obtained with this machine were due, to a large extent, to the presence of an efficient wind tunnel designed for the company by Prof. Witoszynski. All experimental data were procured in this tunnel, including the best possible arrangements of cowlings, fairings, etc. The final model tests were conducted in the laboratories of the Aerodynamic Institute of the Warsaw Politechnical School.

The weight empty (2,070 lb.) applies only to the experimental model, where unnecessary weight was added as a consequence of late changes and the use of two coats of varnish and two coats of lacquer on the inside of the wings. In production there is now used only one coat of special lacquer for the same purpose. It is guaranteed that the weight empty on the ensuing planes will not exceed 2,000 lb.

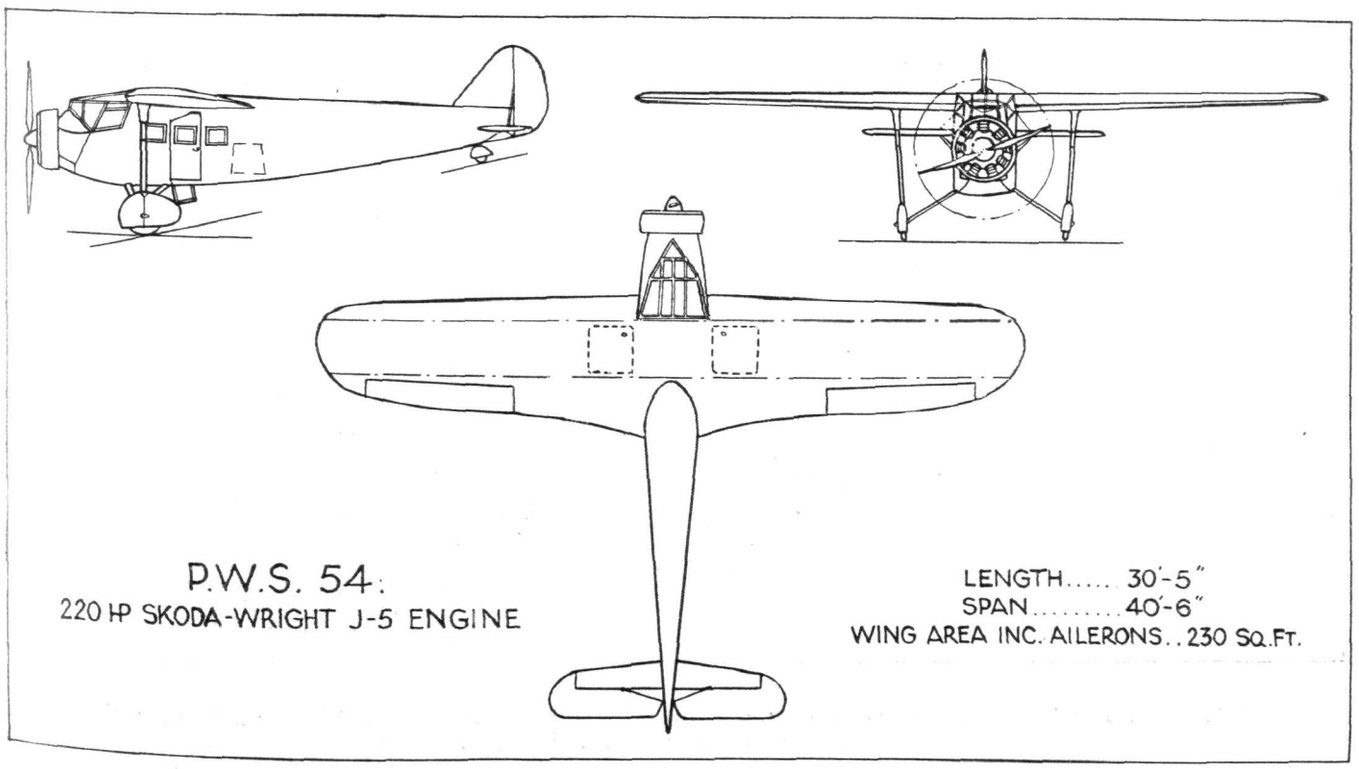
The P.W.S.54 is a high-wing, internally-braced monoplane of steel tube construction with wooden wings. To obtain the maximum possible performance, the drag of the plane was reduced to a minimum through wind-tunnel tests of a complete model and individual parts. In addition to obtaining high aerodynamic efficiency, pains were taken in designing every detail of construction to give the least possible drag. As a consequence all control horns, cables, etc., are buried. The control cables are conducted in a special channel in the bottom portion of the fuselage, with access to them by means of laces.

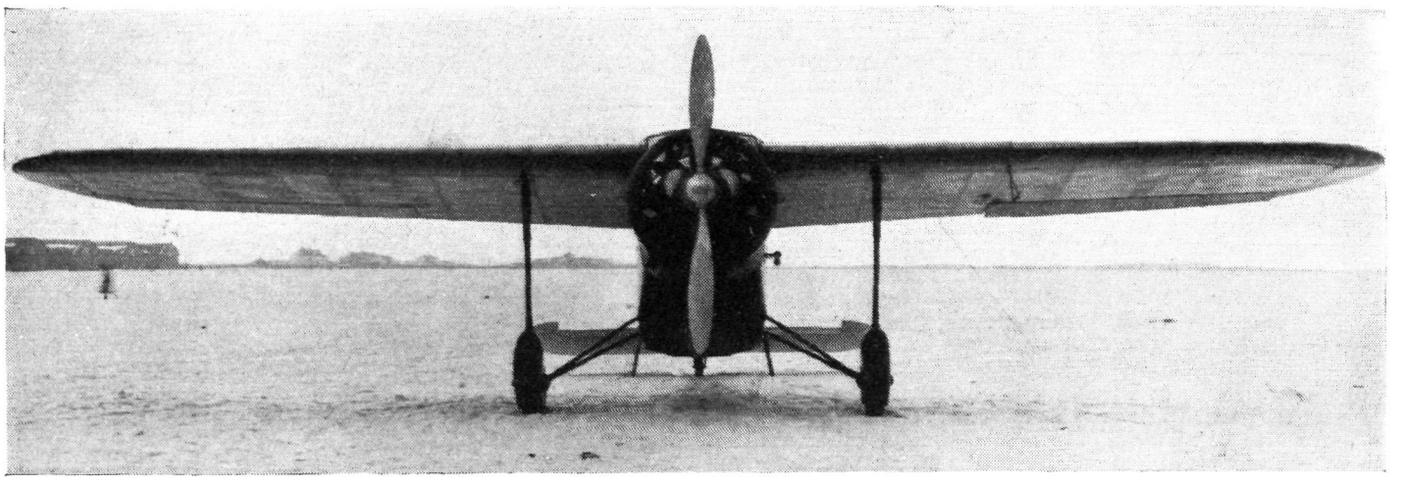
All important control assemblies have been grouped under the pilot's floor. For inspection it is only necessary to unfasten one cover plate.

The passenger compartment is separated from the pilot's compartment, but a sliding door makes entrance possible from one to the other. The passengers' compartment, although seemingly small (41 in. × 49 in. × 71 in.), permits a comfortable seating arrangement for four persons. Two seats are placed in the forward portion, one of them folding to give access to the pilots' compartment.



FOR EASY INSPECTION : The " spats " over the wheels are hinged so that mud can be removed from the fork and wheel with a minimum of trouble.





One double seat is located in the rear of the cabin.

In the centre portion of the passenger compartment, a cut-out in the lower wing surface just above the doors increases the head-room from 49 in. to 55 in. One door on each side of the cabin, provided with retractable steps, offers a comfortable means of entrance. Windows are opened and closed by rotating them about a horizontal axis. There are two baggage compartments, both located just aft of the cabin, one of which is accessible during flight from within. Air is heated by exhaust gases and circulated throughout the cabin.

The pilot's compartment, accommodating one, is entirely closed in, and has a high degree of visibility. The seat is adjustable by means of a hand-operated lever. The instrument board is suspended on rubber-mounted bearings. The pilot's side window may be opened by rotating it about its horizontal axis, thus offering the pilot additional visibility in landing. The control system consists of a control wheel and pedals. All movable joints in the control system are composed of self-adjusting ball bearings. The stabiliser adjustment is located to the right and above the pilot. Bendix brakes are operated directly from the rudder pedals.

The fuselage is of welded steel-tube construction with cross tie-rods in the rear portion, fabric covered. A balloon tyre tail-wheel is used.

The wings are of wood, internally braced, with two box spars and stressed plywood. Near the tips a decalage of 2 deg. is incorporated into the design as a safeguard from spinning.

The tail unit is of welded steel-tube construction, fabric covered. The elevator is balanced. The chassis is of a special type, the wheels being mounted on a fork. The wheel fairing is in two parts, folding back for inspection and removal of the wheel. The shock-absorbing unit is of the oleo-pneumatic P.Z.L. type.

The engine mount is of welded steel-tube construction, attached to the fuselage on rubber bearings. The cowling is fastened with special clips offering no drag.

Fuel tanks are located in the wings on both sides of the fuselage, their capacity being 85 gallons.

THE P.W.S.-54
Skoda-Wright J-5 Engine

Dimensions

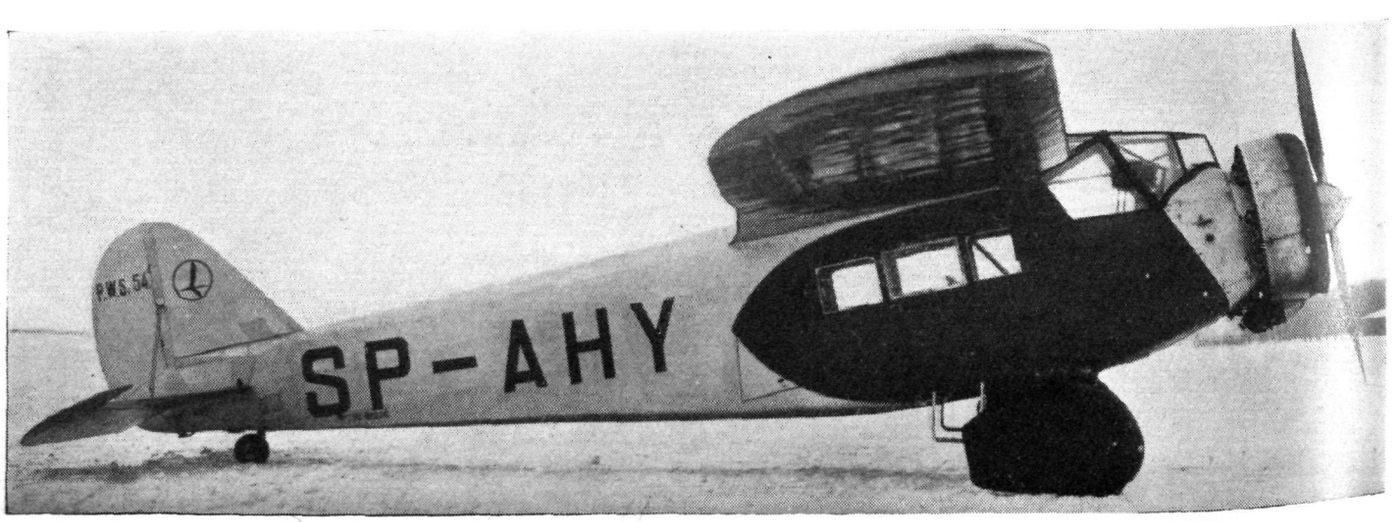
	ft.	in.
Length o.a.	30	5
Height o.a.	8	4
Wing span	40	6
Wing area (including ailerons)	230 sq. ft.	

Weights

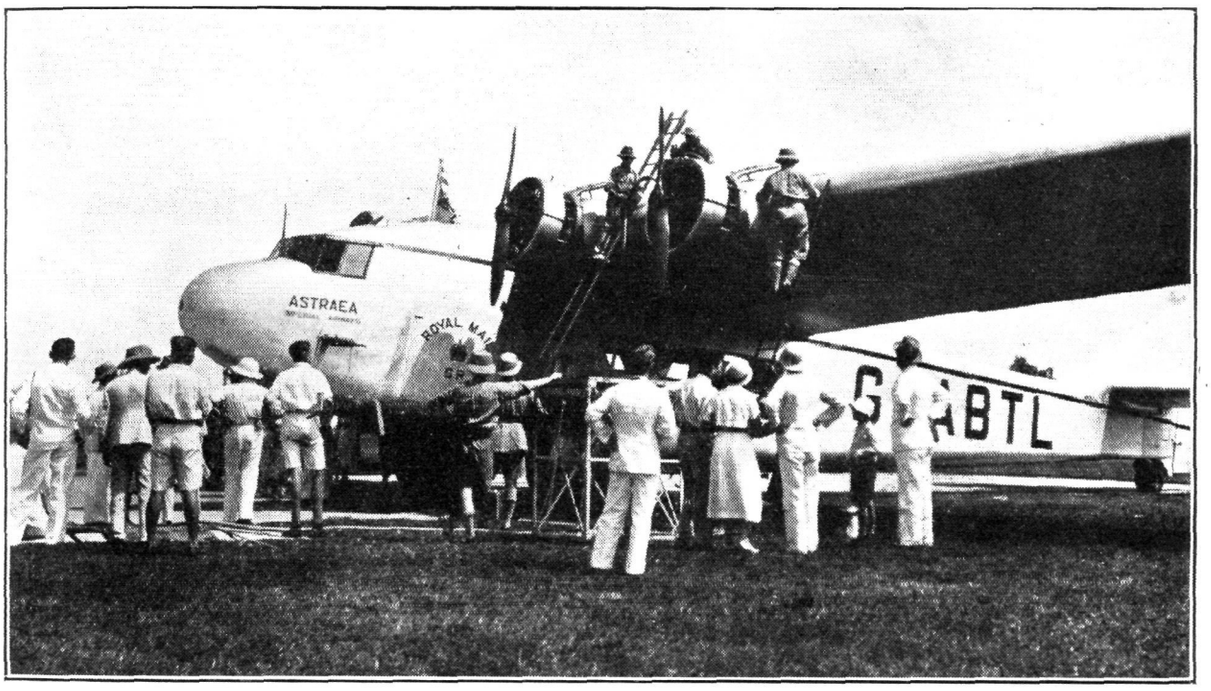
	lb.
Tare weight completely equipped	2,070
Disposable load (normal)	1,230
Disposable load (maximum)	1,300
Gross weight (maximum)	3,370
Ratio gross wt./tare wt.	1,627
Wing loading	14.65 lb./sq. ft.
Power loading	15.3 lb./h.p.

Performance

Maximum speed	145 m.p.h.
Cruising speed	124 m.p.h.
Minimum speed	63 m.p.h.
Service ceiling	13,000 ft.
Absolute ceiling	14,800 ft.
Climb to 1,000 m. (3,300 ft.) in 4 min.	
Climb to 10,000 ft. in 18 min.	
Take-off distance	460 ft.
Landing run without brakes	790 ft.
Range with normal fuel (440 lb.)	550-650 miles.



THE P.W.S.54 : The front and side views on this page show the general lines of this new Polish machine. The engine is a Skoda-built Wright J-5.



The Armstrong Whitworth Astraea (four Siddeley Serval engines) refuelling at Sourabaya.

Astraea's Tour of the East

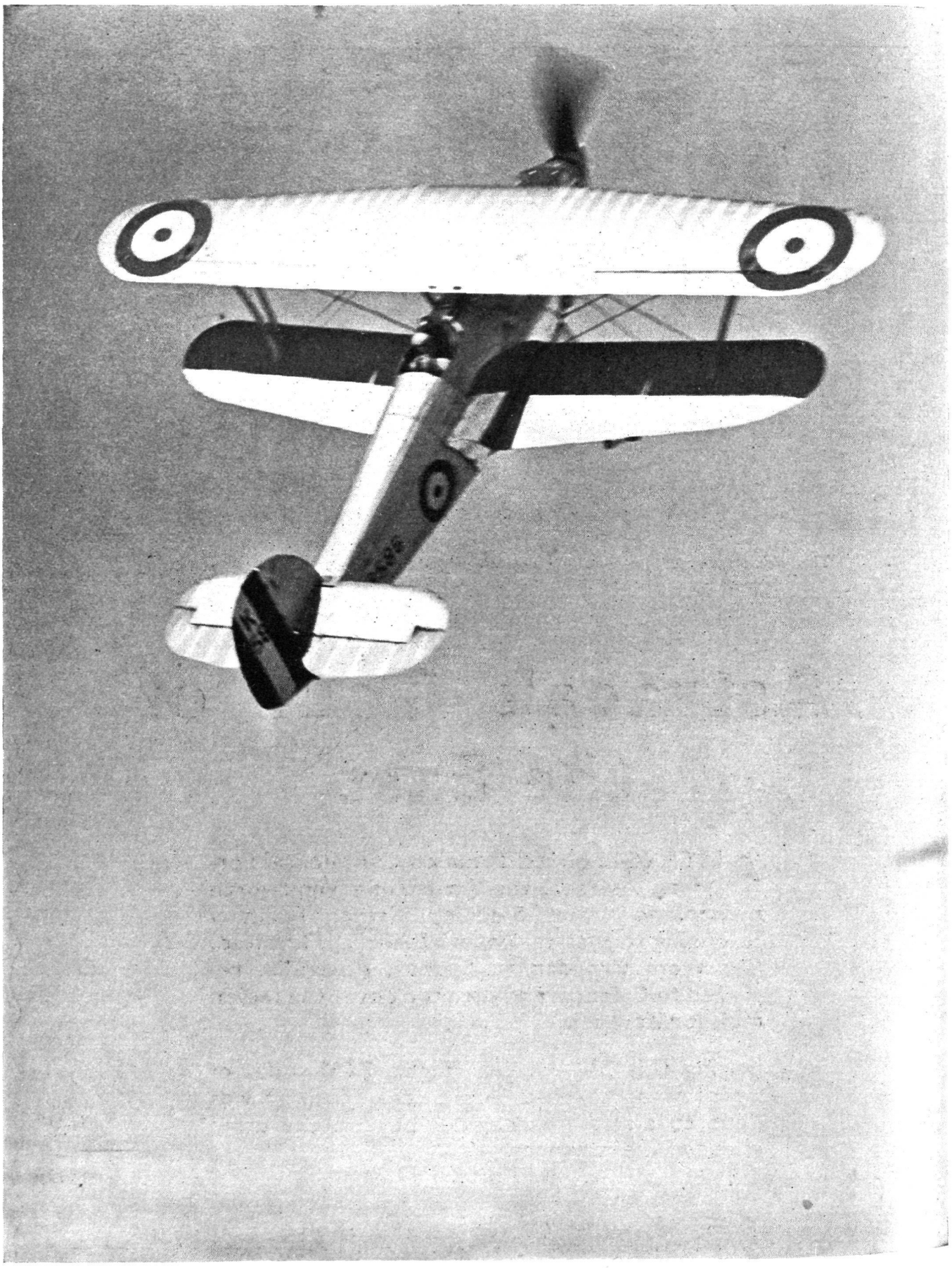
AFTER 60-70 hours' flying on Continental Services, Astraea, the Armstrong Whitworth monoplane (four Siddeley Serval engines) belonging to Messrs. Imperial Airways Limited, flew from Croydon to Sydney, Australia, returned to Calcutta and then took over the Indian mail for Karachi.

During this 23,540 miles' flight, 7,000 miles of which were covered in six days, nothing was done to aircraft or engines beyond the usual care and maintenance.

Sir W. G. Armstrong Whitworth Aircraft Ltd.

WHITLEY, Nr. COVENTRY

BP303



"THE HELICOPTER": A Hawker "Super-Fury" (Rolls-Royce "Kestrel"), piloted by Mr. P. W. S. Bulman, doing a vertical climb above the clouds. As the machine had to cross the path of the "Hart" from which the photograph was taken, the relative movement was extremely fast, and to secure this picture the pilots had to show a high degree of judgment.—*"Flight" Photo.*

Airisms from the Four Winds

Cruise of No. 204 (Flying Boat) Squadron

FOUR "Southampton" flying boats of No. 204 (Flying Boat) Squadron left Mount Batten air station on Monday, August 28, to visit Helsingfors on the occasion of the British Week in Finland. H.M.S. *York* and the band of the 2nd Battn., Black Watch, are also going to Helsingfors for this "Week," which will be held September 4 to 10 to encourage the sale of British goods in Finland. On their way out the flying boats will visit Esbjerg, Copenhagen, and Stockholm. After their stay in Helsingfors the squadron will split up, two boats going to Viborg and two to Sortavala. On September 9 they will reassemble at Helsingfors and return, paying visits *en route* to Riga, Reval, Stockholm, Copenhagen, and Esbjerg.

Long-Distance Flights with "Jupiters"

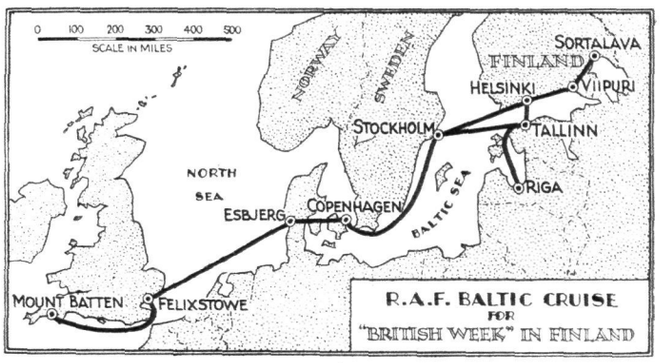
AN overseas station of the Royal Air Force has recently carried out a series of long-distance flights without refuelling, the aircraft used being Westland "Wapitis" fitted with Bristol "Jupiter" Series VIII.F engines. The first flight, in which three machines took part, lasted 8 hr. 53 min., the distance covered being 742 miles. A further flight which was carried out, also with three "Jupiter-Wapiti" machines, lasted 11 hr. 30 min. During this period a distance of 1,040 miles was covered at a petrol consumption of less than 19 gallons per hour.

French Air Minister's Tour

M. PIERRE COT, the French Air Minister, is organising a flight round Europe to demonstrate the latest developments in French commercial aviation. Amsterdam, Malmo, Stockholm, Leningrad, Moscow, Kieff, Budapest, and Prague will be visited, and a total mileage of 4,400 miles will be covered. The machines on this tour will be a Dewoitine 332 monoplane (three 300-h.p. Hispano-Suiza engines), a Marcel-Bloch 120 monoplane (three 300-h.p. Lorraine "Algol" engines), and a Wibault-Penhoet monoplane (three 300-h.p. Gnome-Rhone engines). The flight will probably begin at the end of September. M. Pierre Cot has also accepted the invitation of the Soviet Government to visit Moscow.

Frank Hawks' Fast Flight

MR. FRANK HAWKS, on Friday and Saturday, August 25 and 26, flew from Vancouver to Quebec, a distance of 3,300 miles, averaging 200 m.p.h. He carried a letter from the Mayor of Vancouver to the Mayor of Southampton, which should reach its destination in seven days. The flight was undertaken to demonstrate the practicability of a fast air mail service across Canada.



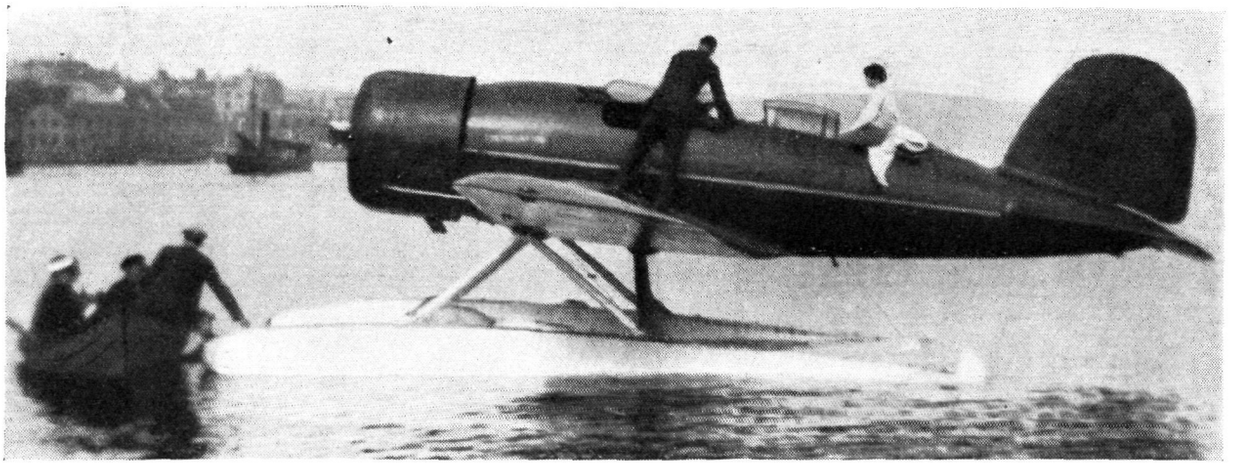
Autogiro Notes

THE two-bladed single-seater "Autogiro," which, as was first announced in FLIGHT, is being manufactured by G. & J. Weir, Ltd., Glasgow, and of which the prototype has already been test flown fairly extensively at Hanworth, is still the subject of considerable test work. The construction is being considered from the point of view of its suitability to be a fully-jigged production job, as also is the engine, which is likely closely to follow the lines of the Douglas "Dryad." We understand that it is not yet settled whether this shall continue to be produced at Bristol or whether it will be manufactured by Weir's.

A batch of C.30 "Autogiros" is now under reconstruction. These will form the first production models of this type. They will basically be the same as the first direct controlled model, the tests of which have already been described in these pages, but will have the Armstrong Siddeley seven-cylinder "Genet Major" engine instead of the five-cylinder model. This increase of horse-power to 140 should greatly improve the take-off. The first of this batch is under construction in the workshops at Heston, where Airwork, Ltd., are building it under the "Autogiro" company's direction. Further machines are being built by A. V. Roe's at Manchester. They will all have dual control.

An amusing position arose recently when the Air Ministry were faced with the question of passing out for his "B" pilot's licence a pilot who had been trained *ab initio* on the "Autogiro" and who had never flown anything else. The Ministry do not possess a modern "Autogiro," nor have any of their staff who test pilots the requisite experience on this type of flying machine. After much delay and talk, we understand that a pilot who had had experience with earlier "Autogiros" was

"THE HUMAN BULLET": Frank Hawks, of "Texaco," and his all-metal Northrop "Gamma" *Sky-Chief*, on which he made his 200 m.p.h. flight across Canada.



THE LINDBERGHS IN EUROPE : Col. and Mrs. Lindbergh, who have been carrying out a survey flight over the Arctic Atlantic air route, about to depart from Lerwick, Shetland Isles, for Copenhagen.

given a "refresher" course by the Autogiro Co., who also lent the Ministry a machine of the latest type so that the cause of all the trouble could be passed out! This incident is surely a pretty strong argument against the Service side of the Air Ministry continuing to control the destiny of civil aviation.

The machines at the school, run by the Autogiro Co. at Hanworth, have been putting in an astonishing amount of flying lately. Several *ab initio* pilots have now obtained their "A" licences on "Autogiros," and have averaged over 100 solo flying hours for the past few months.

If the experiments at present being carried out by Señor de la Cierva are satisfactory, future "Autogiros" will have self-centring controls like the steering gear of motor-cars. When the controls are released, the machine will at once assume normal flying position.

A New De Havilland Machine ?

IT is rumoured that a four-engined cabin biplane is being developed by the De Havilland Aircraft Co., Ltd. It will presumably be something on the lines of the "Dragon," but with four "Gipsy Major" engines, carrying about twelve or fourteen passengers at a cruising speed of about 125 m.p.h. It is not expected to be flying before the middle of next year.

Fokkers for Denmark

FOR nearly 15 years the Danish Army Air Service has been using Fokker aircraft, mostly built under licence. Doubtless the experience which Denmark has had in employing the Fokker methods of construction counted heavily when, recently, a new type had to be chosen. The Fokker modified C.V-E with Bristol "Pegasus" engine was the type chosen, and representatives of the Danish Army Air Service recently visited Holland and England for the purpose of inspecting the manufacture of machine and engine. During the reception test flights the C.V-E had a gross weight of 2,483.5 kg. (5,474 lb.), and at an engine speed of 2,300 r.p.m. and an altitude of 1,400 m. (4,500 ft.) the maximum measured speed was 265 km./h. (165 m.p.h.). The climb to 3,000 m. (10,000 ft.) occupied 7.3 min., and to 5,000 m. (16,500 ft.) 14.2 min. The ceiling was 8,300 m. (27,300 ft.) and the take-off run 121 m. (400 ft.). The landing run, when using the wheel brakes, was 115 m. (380 ft.). The machine has a tare weight of 1,549.3 kg. (3,415 lb.) and a disposable load of 934.2 kg. (2,059 lb.).

Col. Lindbergh's Flight

COL. LINDBERGH, who is prospecting a trans-Atlantic air route, arrived at Lerwick, Shetland Isles, on Thursday, August 24, from the Faroe Islands. On Saturday, August 26, he flew to Copenhagen, where he was given an enthusiastic welcome. Col. Lindbergh has been exploring this northern air route on behalf of Pan-American Airways, who have ordered two amphibians, with a cruising speed of 95 m.p.h. These machines can carry 41 passengers, 2,000 lb. of cargo, and have a range of 2,400 miles.

Air Tour of Holland

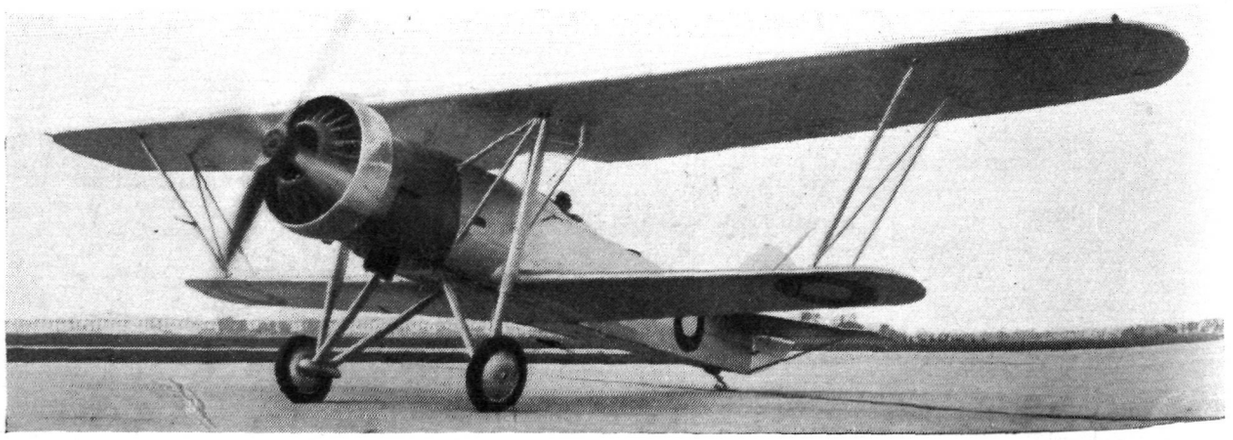
A TOUR of Holland by air, arranged by the Ministry of Defence, the Royal Dutch Air Lines (K.L.M.) and private flying clubs took place on Friday and Saturday, August 25 and 26. A complete circuit of the country was made, many of the principal towns and aerodromes being visited.

International Touring Competition, 1934

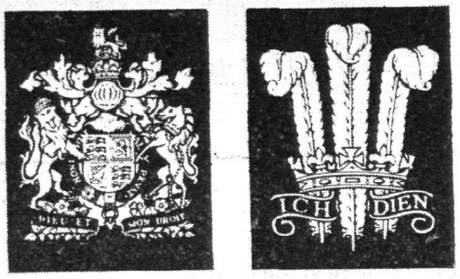
THE 1934 International Touring Competition will be organised, as we have already announced, by the Polish Aero Club. It will be held between July 15 and September 20 from Warsaw. Only aeroplanes of less than 560 kg. (1,235 lb.) empty weight will be eligible. Entries will be received by the Polish Aero Club up to December 15, 1933.

Ulm to Try Again

HIS monoplane, *Faith in Australia*, which was damaged while being fuelled at Portmarnock Strand, County Dublin, in preparation for its trans-Atlantic flight, having now been repaired at the Manchester works of A. V. Roe & Co., Ltd., Flt. Lt. C. P. Ulm is to fly the machine to Dublin this week to prepare for his flight to New York, the next stage of his round-the-world flight. He will be accompanied by Mr. G. P. Allen, who is to act as navigator.



FOKKERS FOR DENMARK : The Fokker C.V-E (Bristol "Pegasus") being supplied to the Danish Army Air Service.



BY APPOINTMENT

FIRST FLIGHT OVER WORLD'S

HIGHEST

MOUNTAIN

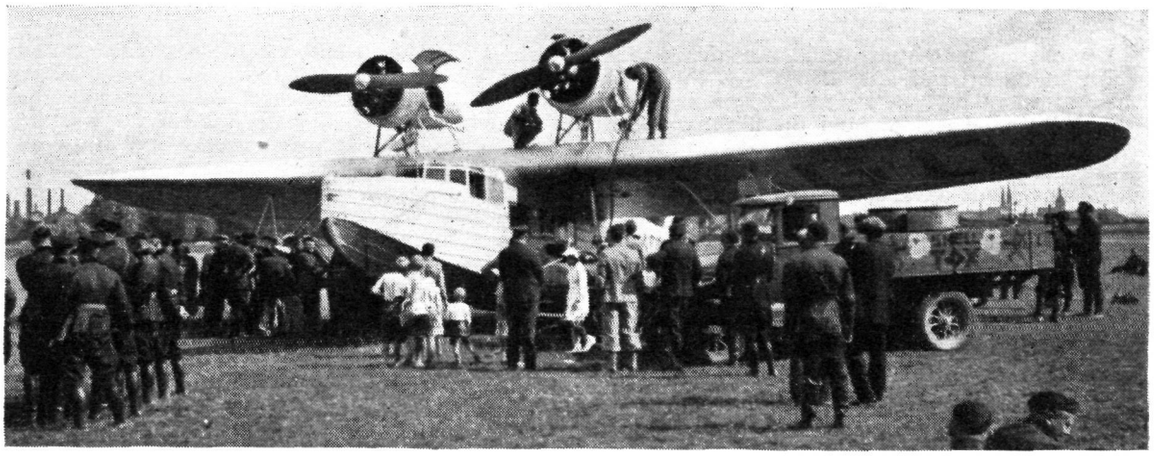
LONGEST

NON-STOP FLIGHT

FASTEST

SPEED EVER

ALL ON



The Saro "Cloud" arrives at Riga for the demonstration.

AN AMPHIBIOUS DEMONSTRATION TOUR

FLIGHT has always held that amphibians are a type of aircraft to be encouraged. The scope given by the possession of an undercarriage which will permit the machine to be landed either on the water or on the land is so great that it is of incalculable advantage in many parts of our Empire. Unfortunately, for many years designers have seemed unable to achieve a performance in an amphibian which made it a commercial proposition when compared with more normal machines. Now that condition has been changed, and in the Saro range of amphibians we have aircraft which can take their place in the world wherever there is serious work to be done. Below we give a report in diary form, which we have obtained from Saunders-Roe, Ltd., the directors of which firm have just completed an extensive tour in a Saro "Cloud":—

The Saro "Cloud" (G-ACGO) was fitted with two Armstrong-Siddeley "Serval" 340-h.p. engines. It completed its initial experimental test flights at Saunders-Roe Works, Cowes, on Saturday, July 15.

July 16.—At 12.40 p.m. a demonstration tour of Northern and Central Europe was started. The pilot was Capt. S. D. Scott. Mr. John Lord and Mr. J. de C. Ballardie, both directors of Saunders-Roe, Ltd., were aboard. One mechanic was carried, who maintained the aircraft and engines throughout the tour. Lympne was reached in 50 min. A straight course from Lympne across the North Sea brought Amsterdam in sight in 1 hr. 45 min.

July 17.—Flew to Rotterdam and demonstrated to local air officers.

July 18.—Landed at Dutch Military Air Force Station, Susteburg, where the officers inspected the boat. Left during the afternoon for Copenhagen, arrived at 7.30 p.m., and landed on the Civil Aerodrome.

July 19.—Special permission was obtained from the Harbour Board for a landing to be made in Copenhagen.

July 20.—Left for Gothenburg at 2.10 p.m. Demonstrations were made on the aerodrome and on the sea. Oslo was reached at 7.15 p.m. Met by our old friend Col. Klinkenberg, Chief of the Norwegian Air Force.

AT BRUSSELS: From left to right—John Lord; Capt. S. D. Scott (pilot); A. Wallace Barr; V. Bloos (representing Cellon in Belgium); Van der Goes (agent for Hawkers and Handley Page in Belgium); and J. de C. Ballardie.

July 21.—Demonstrations made to the Navy and Army and Air Chiefs at Oslo and Horten, a naval seaplane base about 80 miles from Oslo.

July 22.—Flew from Oslo to Stockholm.

July 23.—At Stockholm we were joined by Mr. Wallace Barr, Managing Director of Cellon, Ltd. Flew across the Baltic to Visby in the Island of Götland, where the Managing Director of Swedish Airways—Capt. Carl Florman—was interviewed. The return flight to Stockholm was made the same evening.

The Saro "Cloud" in a small river at Wyszkow, in Poland, where a landing was made almost in the dark.

July 25.—Demonstrations given to officers of the Swedish Air Command. In the afternoon we flew across the Baltic to Hangö, in Finland. The boat lay at her own anchor in a small harbour during the night, and the flight was continued to Helsingfors the next morning.

July 28.—At Helsingfors the boat was quartered in a large and very convenient naval air station hangar, where there was a most excellent slipway. Demonstrations were given from this slipway to Col. Lundquist and a number of his officers, after which the British Minister honoured us with his presence, and inspected the machine. We took the Minister and Lady Spurling and other members of the party for a short flight. All expressed their delight at the ease with which the aircraft ran up and down the slipway under its own power. Later in the day the boat was flown to Tallin, in Estonia, and landed on a large lake bordered with weeds, about 3 miles from the city.

July 29.—Continued to Riga, in Latvia. A landing was made *en route* at a small island to put ashore Maj. Post, Chief Technical Officer of the Estonian Air Ministry.

July 31.—Demonstrations given to Col. Ruskievicks and many of his officers. In the evening we flew on to Kovno, in Lithuania.

August 1.—Demonstrations were given to the General and his officers. Mr. T. H. Preston, the Chargé d'Affaires, joined us. After lunch, flight was resumed to Warsaw. An angular course had to be flown to avoid the border line between Lithuania and Poland, where mild hostilities still prevail. After the border to Poland had been crossed, it was realised that Warsaw could not be reached that night. We studied the map and picked out a river some 20 miles ahead. On arriving at the river, we chose a section near a small village and landed successfully in the dusk. The boat was taxied close to the bank, the landing wheels pushed into the mud, and the anchor was thrown ashore.

We desire to acknowledge the hospitality received at the Polish Chateau (the home of the Count and Countess Skarzinski), only 100 yards away from where we landed. The entire crew were immediately given delightful quarters in the Chateau. A dinner was given in our honour, and dancing on the terrace concluded an enjoyable evening.

August 2.—Count Skarzinski was flown with his son to Warsaw. The boat's anchor was transferred to mid-stream by a small dinghy, where the engines were started. Flight was resumed amid cheers and enthusiastic wavings of the entire village. A landing was made on the Civil Aerodrome at Warsaw 30 minutes later.

August 3.—Demonstrations, including landings in the restricted spaces between very numerous sand-banks on the River Vistula, were given to Gen. Rayski and many other officers. Such landings had been considered quite impossible under the apparently difficult circumstances by the local authorities. During our stay at Warsaw we intimated through the British Embassy that we should like to make an official call on the Polish Aero Club. Upon our arrival at this Club we were received by the Secretary and several members of his Committee, and we were delighted to find that the Director of Civil Aviation in Poland and several other notable people had been invited to meet us.

August 4.—A flight was made to Breslau *en route* for Prague, where we arrived the following day.

August 7.—Demonstrations were given to the General Commanding the Air Force. The section of the river chosen by the local authorities for the demonstration looked uncomfortably difficult, as viewed from the air. The river was only about 70 yards wide at this point, and with the direction of the light wind which was blowing at the time it was necessary to take off towards a bend in the river some 300 yd. ahead, which was guarded on one side by hills about 400 ft. high and on the inside of the bend were very large trees. The "Cloud" was off the water in about half the distance available, and climbed up in a turn between the hills and trees in a most convincing manner.

August 8.—More demonstrations were given on a crowded section of the river. The flight was continued to Nürnberg, in Germany.

August 9.—The journey from Nürnberg to Cologne was flown with an intermediate landing on the Rhine. After landing at Cologne, Brussels was reached the same evening.

August 10.—A large number of Belgian Air Force officers inspected the machine. After lunch, Lympne was reached in 1 hr. 25 min., where Customs were cleared, and the last leg to Cowes was completed 50 min. later.

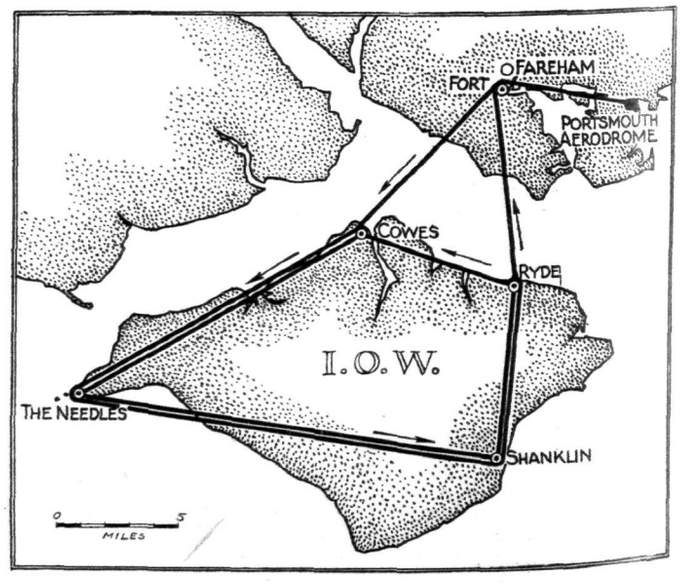
The voyage described above is considered to be a very exceptional and successful one, in that many different countries have been visited in a short time, and most convincing demonstrations have been given in unexpected places and varying conditions. In many cases landings and take-offs were made, many of which appeared to the local authorities to be impossible.

The keenest interest in the aircraft was shown in all countries visited. Upwards of 400 persons were given flights, and a distance of over 4,000 miles was covered. No difficulty whatsoever was experienced with either the aircraft or its engines.

PORTSMOUTH, ISLE OF WIGHT AIR RACE

UNDER the regulations of the F.A.I. and the competition rules of the Royal Aero Club, there will be held, on Wednesday, September 6, an air race round the Isle of Wight. This race, which will begin at about 3 p.m., will have starting point and finishing point at Portsmouth Aerodrome. The course will be twice round the Isle of Wight with turning points at the following places. A fort, 1½ miles S.S.W. of Fareham (just west of where the Fareham-Lee-on-Solent road crosses the railway line to Gosport), Cowes Aerodrome, Coastguard station on cliffs above the Needles, Shanklin (Apse) Aerodrome, Ryde Aerodrome; 2nd round—Cowes Aerodrome, Coastguard station above the Needles, Shanklin Aerodrome, Ryde Aerodrome, fort (as before), and so to the finishing line at Portsmouth Airport. Competitors must pass each turning point, leaving it on their left at a height not exceeding 500 ft. and at a distance not exceeding 300 ft. Competitors are responsible for seeing that they are in possession of a current third-party insurance policy for their aircraft and must satisfy the Royal Aero Club on this point. Aircraft must be in Portsmouth, completely erected, not later than 10.45 a.m. Wednesday, September 6. When taking off care must be taken to pursue a straight course so as to avoid any danger of collision with other machines which may be leaving the ground at the same time. The first prize will be the Peters Challenge Trophy, presented by Lt. Col. J. W. Peters, and £10, the second prize £5. Both these two latter prizes have been presented by the Portsmouth Aero Club. The entrance fee is £1. Entry forms can be obtained from the Secretary, Portsmouth Aero Club, and must be in by the last post on September 2.

(With reference to the rule which states that machines must pass all turning points on their left, we feel that there must be a mistake. If the last turning point is to be passed on the competitor's left (the fort between Fareham and Gosport, on the second round) it will mean that each competitor will have to circle this point completely before being able to get on to a course for Portsmouth and the finishing line, which would be highly dangerous. Presumably this fort is to be passed on the competitor's right on the second round.)



The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

August 31, 1933

CONTENTS

ZAP FLAPS AND AILERONS

By Temple N. Joyce, Zap Development Corporation, Dundalk, Baltimore, Ma.

(*Continued from page* 47)

Ailerons : Explanation of Zap Ailerons and Functions

During the explanation to the engineers of the B/J Company and Zap Corporation when the Aristocrat was first brought to our plant, the discussion of the phenomena surrounding Zap ailerons became quite intense. It had been noted that the ailerons were effective at or near the stall and greatly improved when the flaps were in operation. It was disclosed that the ailerons have a material effect upon the downwash of the wing, and in view of the fact that the flow over the top surfaces is increased by the presence of the split flap at the trailing edge, the ailerons are actually operating in a stimulated flow when the flap is down. These facts were substantiated later when it was found that the ailerons were at their best efficiency when relatively very close to the wing and diminished at a substantial rate when placed too far forward of the trailing edge and too far away in a vertical direction. The original rolling moment curves presented by the Zap Corporation only represented meagre researches as to the proper vertical and fore and aft position, aileron airfoil section, aspect ratio, etc., but the data that was available indicated that the control at low speeds would be excellent. It will be noted in comparing the values of rolling and yawing moments of Fig. 9, that the plain Zap ailerons are approximately equal to the conventional ailerons of the same area. Subsequent tests and present research with modified slotted Zap ailerons show increased rolling moments with considerably lower hinge forces, which are now regarded as not only being equal to, but, in some instances, are superior to conventional Frise types when acting in conjunction with unflapped or flapped airfoils.

The B/J Company was very much interested in determining just how much rolling moment the Zap ailerons were capable of producing; how much of this was due to lift increase and how much to spoiler in contrast with conventional ailerons. In order to determine this, our first tests consisted of an 8 in. by 48 in. airfoil on which a Zap aileron was superimposed throughout the entire span with the idea of determining the actual flow phenomena that took place when the ailerons were deflected through positive and negative angles. It was found that when the ailerons were suspended independently of the wing and were deflected through positive

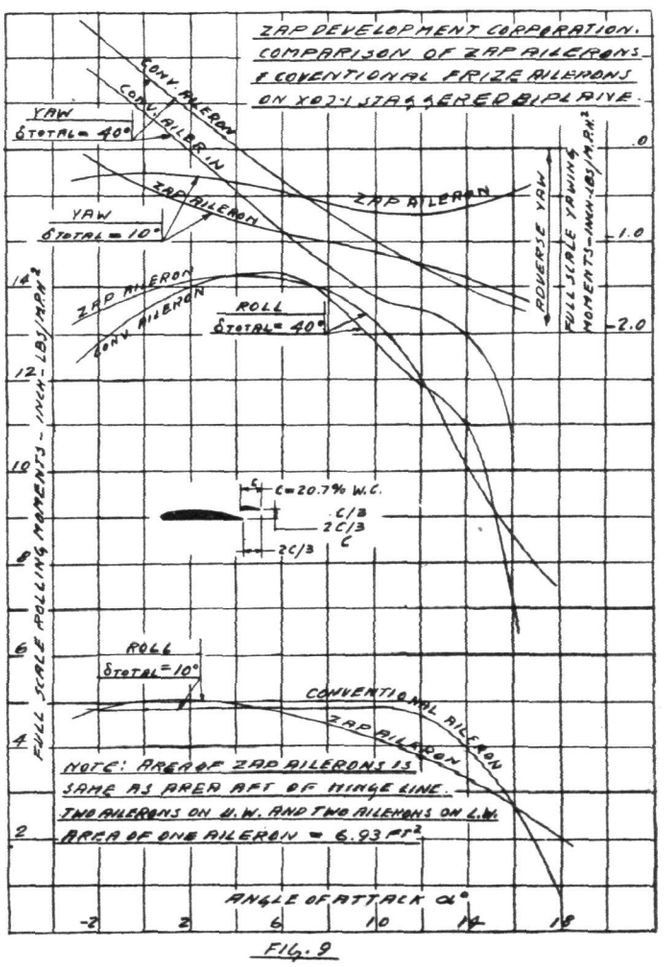


FIG. 9

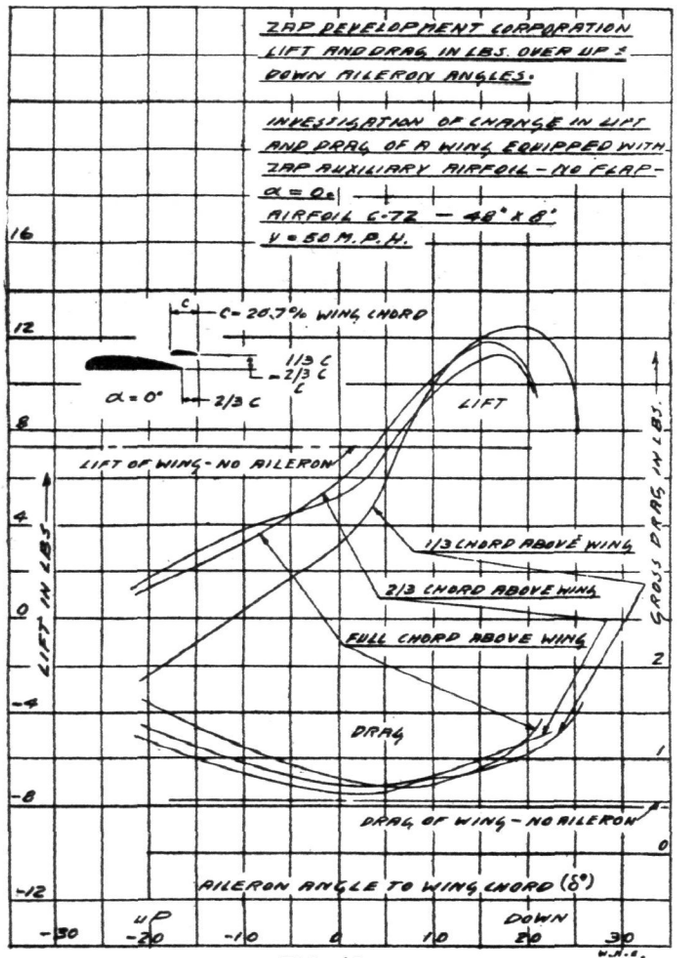


FIG. 10

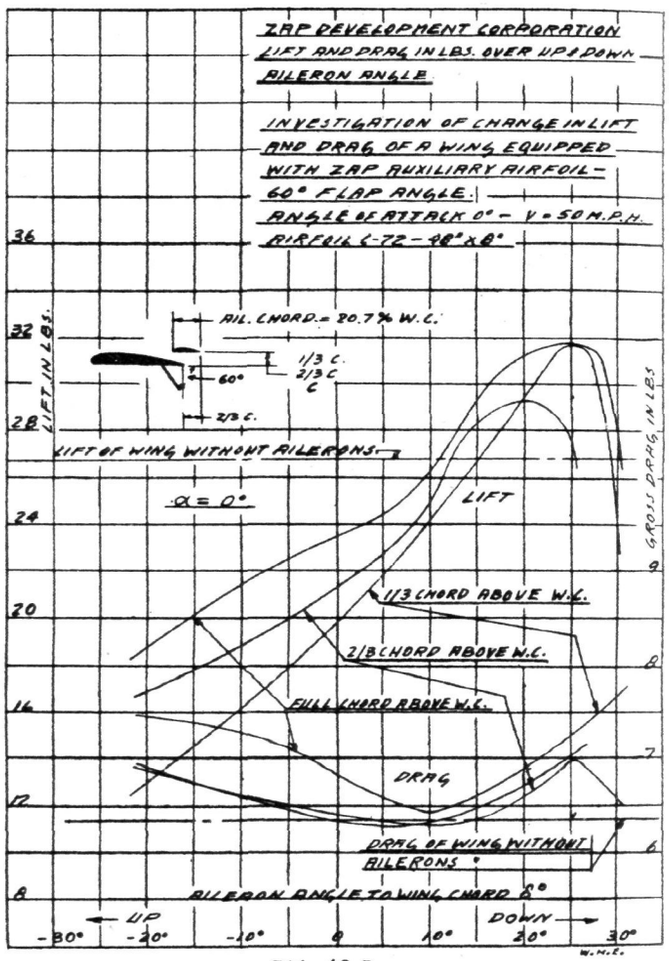


FIG. 10 B

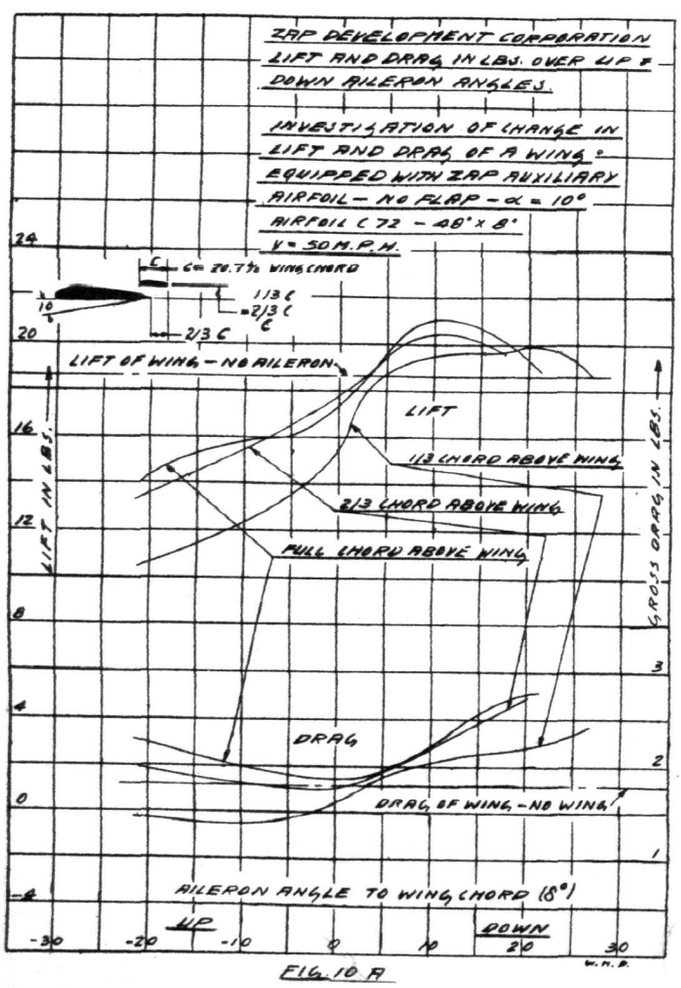


FIG. 10 A

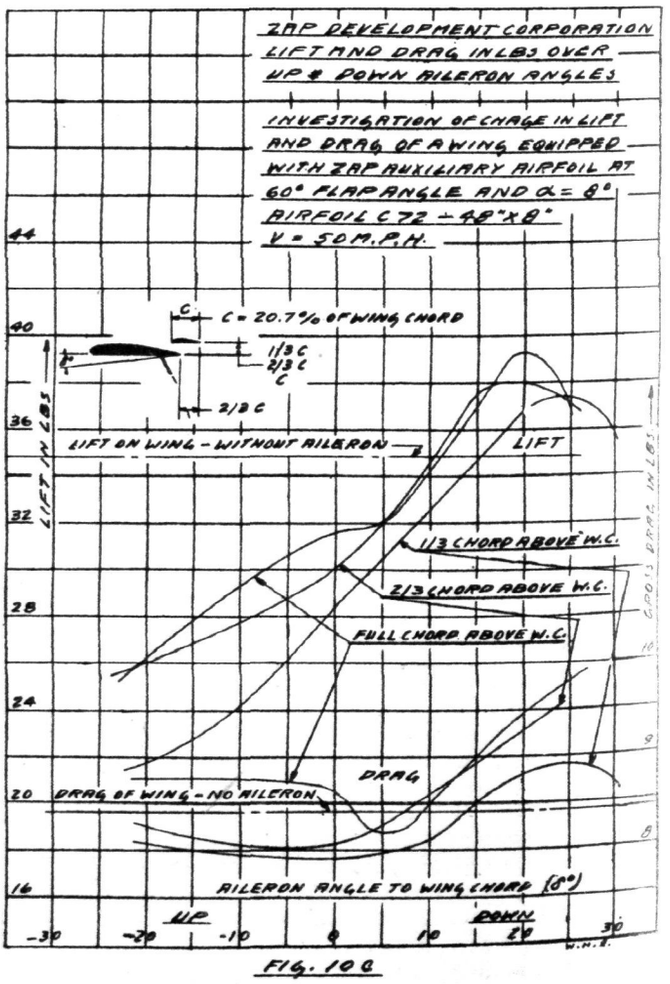


FIG. 10 C

angles, there was a large increase in lift induced in the major airfoil as well as the lift created by the aileron itself due to its own airfoil action. On Figs. 10, 10A, 10B and 10C are some of the results of these tests with the 8 in. by 48 in. airfoil showing the lift increases with positive angle and its spoiler action due to negative angles, as well as the drag increases or decreases. In these figures the drag of these auxiliary airfoils across the entire span for various angles of attack of the main airfoil is also shown. This increase in drag will be in the nature of approximately 1 per cent. loss in speed of the aeroplane when the ailerons cover 50 per cent. of the semi-span. In the application of the Zap ailerons to a conventional Navy biplane, shown in Fig. 14, where there was no particular attempt made to have a clean installation, the loss in speed was 1 per cent. plus. There is additional research now being done on this type of aileron to absolutely determine the optimum fore and aft position and the best combinations of this with vertical location as well as the proper airfoil shape, the correct aspect ratio, the best shape of wing tip and the proper relation of aileron chord to main airfoil chord. In Fig. 11 the hinge moments of a straight Zap aileron are shown which indicates that for high speed aeroplanes there will be excessive stick forces (but which are quite practical on slow planes of the private class). It is interesting to compare the hinge moments of the conventional unbalanced aileron, plain Zap and slotted Zap ailerons in Figs. 11 and 11A. All Zap ailerons are quite sensitive to vertical and horizontal location, depending to some extent on the wing section; and their neutral setting is most important. The slot of the aileron is quite different from that which is used on a wing due to its proximity to the wing upper surface, and its form and setting must be carefully determined. In Fig. 12 is shown the effect of placing the aileron in several fore and aft positions on the forward part of the wing as compared to the best position ascertained so far by us.

It might be interesting to bring out the following

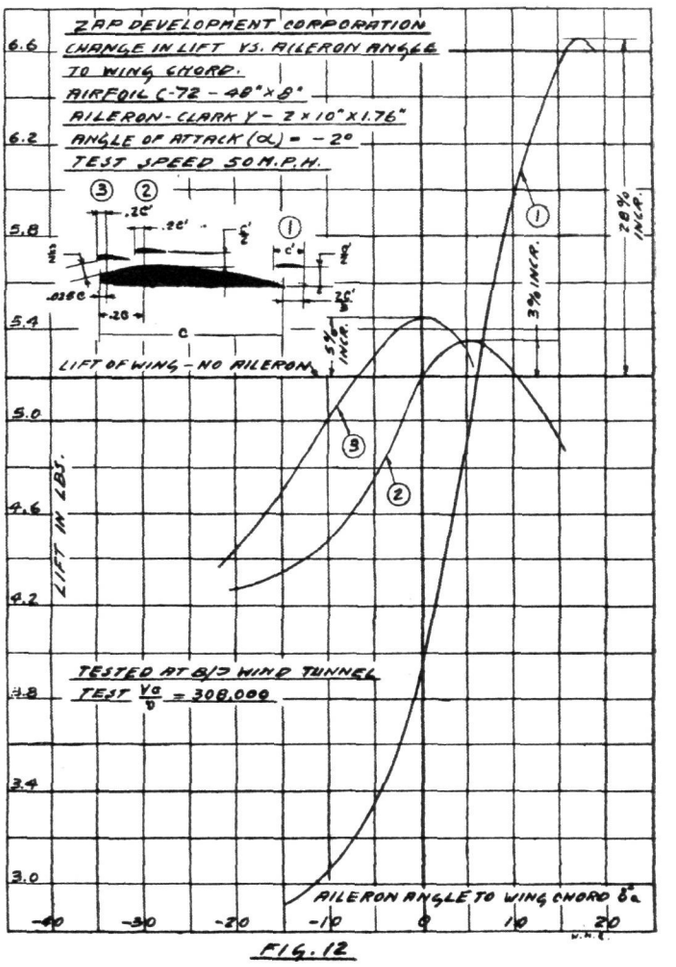


FIG. 12

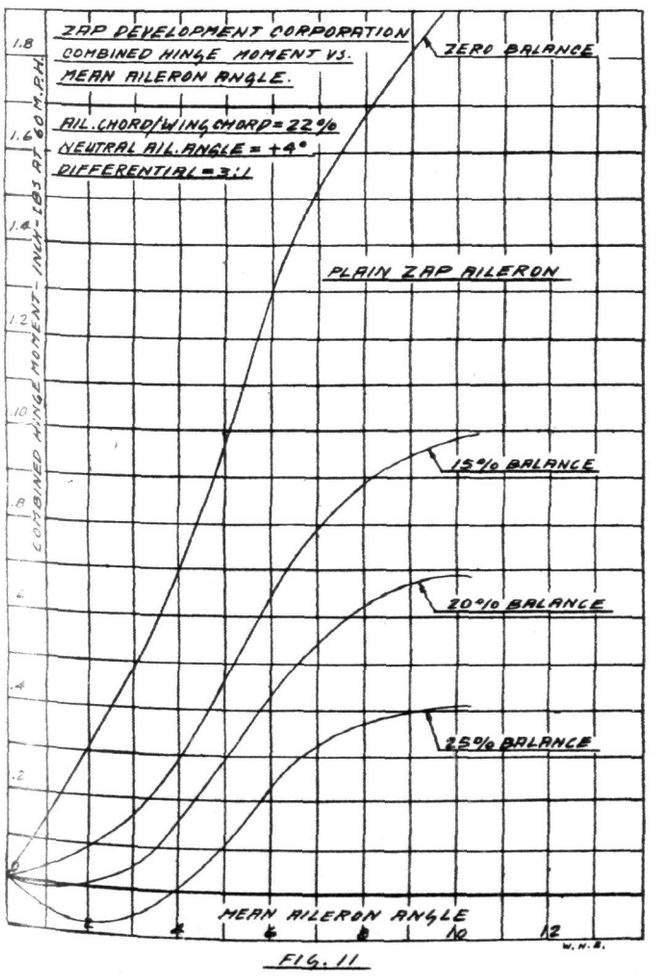


FIG. 11

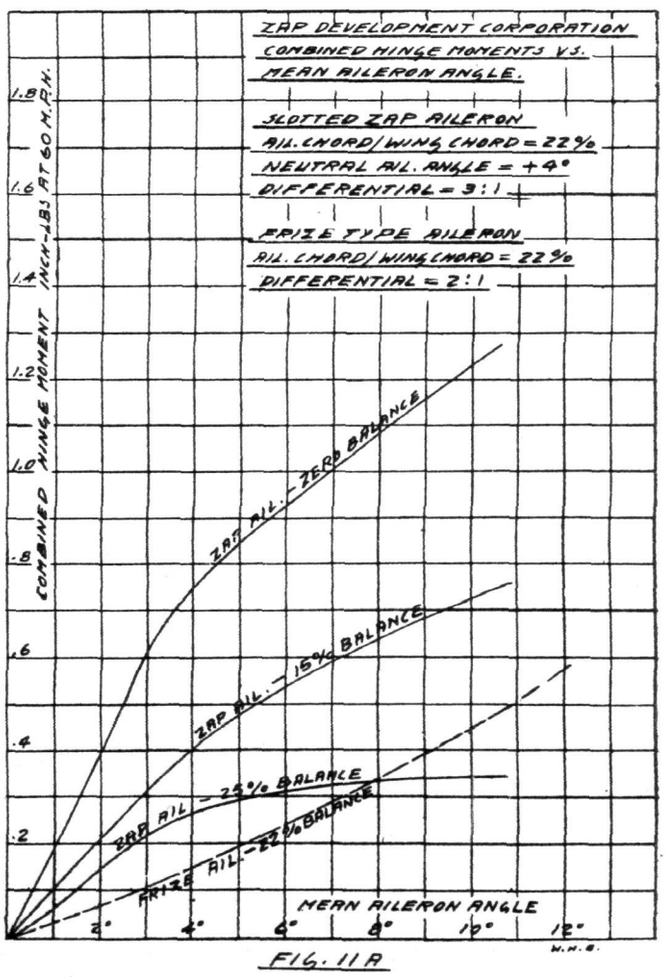


FIG. 11A

facts to differentiate between the Zap ailerons and the conventional and floating types. Previous to the development of the Zap aileron, any attempt to use a trailing edge flap was immediately handicapped by the fact that from a half to two-thirds the span was used for lateral control, thereby diminishing the available maximum lift-increase. When evaluating their respective merits with any type of lateral control, there are two conditions of flight that must be considered: control above the stall and below the stall. With the conventional aileron, if the plane is approaching a landing in a glide above the stall but very close to the maximum lift, and a wing is unavoidably dropped when the aileron is moved to a positive angle with the idea of picking up the low wing, several conditions are to be observed. Any small deflection of the aileron is reflected in a change in the lift on the major airfoil. This is of distinct advantage, because small aileron surfaces can be made to produce a rather substantial rolling moment by influencing the flow over the major airfoil. The conventional aileron, however, is at a disadvantage in that a large movement of the aileron might create a resultant angle of attack that would be beyond the critical angle and cause the wing to stall and further accentuate the dropped wing condition. Simultaneously with this, due to the unfavourable yawing moment, the wing tends to rotate backwards and still further decreases the lift with the possibility of entering a spin. Any further positive movement of the aileron only aggravates the stalled condition from a standpoint of flow over the major airfoil and at the same time induces further unfavourable yawing.

We will compare this with the floating aileron and later the Zap. In the condition where the aeroplane is approaching the ground, close to the point of maximum lift, but with floating aileron, if the wing is inadvertently dropped a positive deflection of the floating aileron will create an increase in lift, but only an amount equal to the lift generated by an airfoil of that particular aileron area and section wing naturally affects the flow over the top surface. Analysing the several conditions, as was done in the case of the conventional floating ailerons, we find that if the aeroplane is being brought in close to the point of maximum lift and the wing is inadvertently dropped with a positive movement of the Zap aileron, there is not only created a rolling moment by the increase in lift on the aileron acting as an airfoil section alone, but there is also an induced lift on the major airfoil together with a yawing moment that is slightly less than the conventional aileron. (See Fig. 9.) At or below the minimum flying speed at which an unflapped aeroplane can fly, by reason of the fact that the Zap ailerons are used in conjunction with Zap flaps, the aileron is actually operating in an area of stimulated flow and consequently produces favourable rolling moments at speeds far below the speed at which a conventional wing aeroplane can be controlled with Frise or floating types. Even without the effect of stimulated flow due to the flap, the ailerons produce rolling moments comparable with conventional ailerons per unit of area. It must again be borne in mind that conventional ailerons cannot be used efficiently with flaps located across the entire span of the wing by reason of the fact that they would be blanketed by the flap. If they are used, the flap can only occupy the inner portion of the span. At the reduced flying speed accomplished with the aid of any slow speed device which is below that of the minimum flying speed of an aeroplane without flaps, the conventional aileron is all the more ineffective by reason of the fact that it is operating in a reduced flow of air, whose velocity is only to that of the plane and not the stimulated flow over at that particular angle of attack. There would be no induced flow over the surface of the major wing. In designing such an aileron, this would have to be taken into consideration, and the aileron would have to be quite large so as to produce within itself a practical rolling moment at the reduced speed of flight brought about by the use of flaps or any other slow speed device. The resultant aileron, by reason of its size, would then present very difficult structural features, as well as added weight and drag. This type of aileron naturally would have no bad effect of aggravating the stalled attitude of the dropped wing either when the aeroplane was coming in slightly above the stall or beyond and would have still further the advantage, by reason of the angle of its lift vector, of a favourable yawing moment that would tend to pull the low wing forward and increase its velocity and consequently its lift.

With the Zap aileron, the first reaction is that it is just another airfoil suspended above the wing of which there have been numerous designs in the past. The original Curtiss type was mounted at a considerable distance from either surface of the wing and through its angular movements produced a workable rolling moment. These ailerons went out of existence because of the fact that they were inefficient. They induced no increase in lift over the major airfoil sections and if they were large enough to produce a usable rolling moment, their drag, mechanism and structural features were decidedly objectionable.

Preliminary investigation indicates that Zap ailerons will also be quite interesting in any slot and flap application in the future. At this point I might give some of the practical reactions that I have had in flying Zap-equipped aeroplanes, and ask your patience while indulging in a little elementary theory of flying. There is no doubt that reduced minimum speed, with adequate lateral control and good inherent stability, will materially lessen the fatal crashes in aviation. In the majority of instances, fatal crashes occur from flying too slowly or gliding into a forced landing immediately after motor failure. The loss in lift at a speed just below the minimum naturally causes the aeroplane to mush with a consequent increase in the resultant angle of attack, which, when beyond the critical angle, results in a critical loss in lift and altitude. The reason for flying slowly is brought about by the fact that the pilot is forced to do so in order to get into a given aerodrome over surrounding obstacles. Realising that the modern aeroplane glides so flat and so fast, as is becoming more evident each day with the cleaning up of designs and increasing wing loadings, and in attempting to consume the smallest possible amount of aerodrome while in the glide, and also after levelling out, the pilot invariably brings the plane in as close to the point of maximum lift as he feels that he is capable of doing—and the better the pilot, the more likely he is to feel that he can play close around the stall point. If a sudden gust, or inattention on the part of the pilot, inadvertently brings the flight attitude over the critical angle, a crash is likely to result and the impact with the ground must be very close to the minimum flying speed of the ship, which, as assumed, is already very high. The pilot cannot put his nose down after coming in over an obstacle and pursue a steep angular path to the ground at a safer angle of attack because of the large pick-up in flying speed. This increase in speed would prolong the path of flight tangential to the ground which almost invariably results in a high speed two point landing. With a Zap equipped aeroplane, it is not necessary for the pilot to bring the aeroplane in close to the point of maximum lift, as far as excessive utilisation of the aerodrome is concerned. The Zap equipped aeroplane, because of its high lift and drag, can be brought in along a flight path that is so steep as to permit only a small utilisation of available aerodrome distance. Even when the nose is put down at a 45 or 50 degree angle, the increase in speed is small, and when the aeroplane is levelled out, the drag causes it to decelerate very rapidly and the high lift permits a slow minimum speed when it drops on the ground. It might be pointed out that the steep approach to the ground is a disadvantage from a standpoint of the technique required in

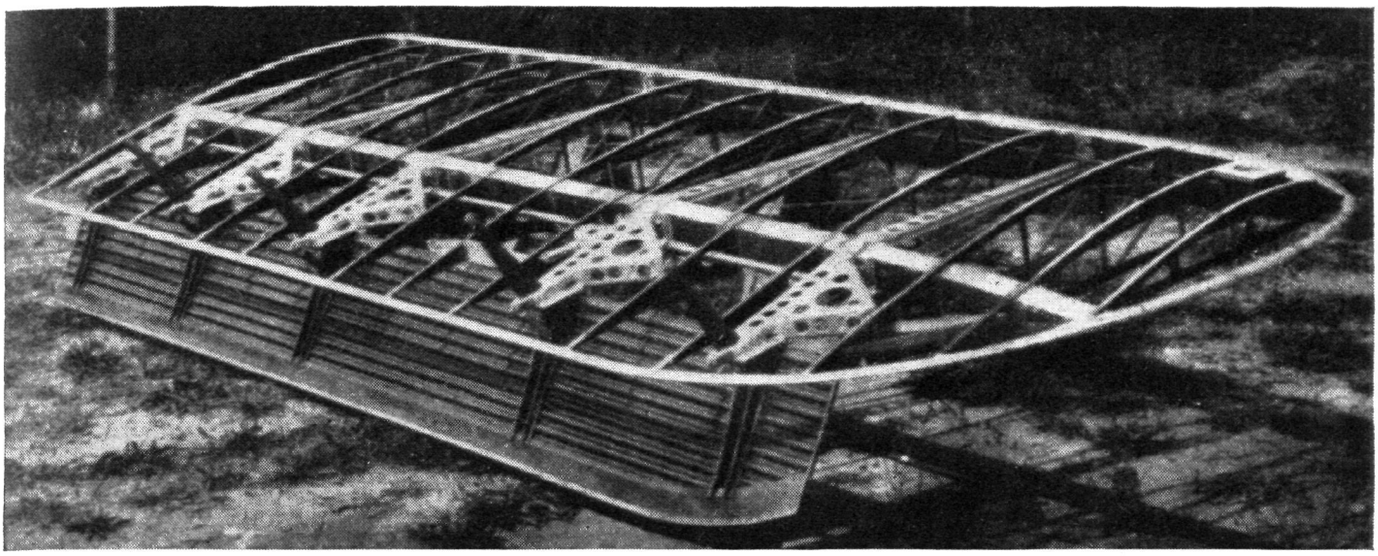


Fig. 13.—Zap Flap Installation on Starboard Upper Wing

landing. This would be admitted if it were not for the fact that the increased lift permits a speed along the flight path so materially reduced that from actual experience, there have been no adverse comments by pilots. There has been instances of aeroplanes being equipped with airbrakes but without the necessary increases in lift. The result has been that, as the aeroplane must be dived at the ground at a sharp angle and at an unreduced minimum speed, the rate of descent is so great as to be quite disconcerting. The reaction is caused by the necessary sharp flaring action close to the ground and the short time interval aggravated by the high vertical velocity. With the modern aeroplane, whose cleanness has gone so far beyond the aeroplane of several years ago, the addition of the drag imposed by a flap does nothing more than bring the gliding angle back to what we were accustomed to and eliminates the bad floating characteristics. If an aeroplane were infinitely dirty from a drag standpoint and had a high wing loading and flaps in addition, it would be conceivable that the aeroplane would have to be dived at the ground at a 50 to 60 degree angle and the transition from this attitude to the 12 to 15 degree angle of attack for landing would quite complicate the technique of landing.

Here we come to the problem that is often advanced by the automatic landing proponents. It is the writer's opinion that flying will not reach popular enthusiasm sufficiently to warrant a large industry until the human element of flying has been reduced far beyond what it is to-day. The place where the greatest human judgment is necessary is in that transition which takes place when the aeroplane comes in at a given negative angle in a glide and must be levelled off with the angular attitude changing to 12 or 15 degrees positive. It would be most desirable to build an aeroplane in which the pilot could wind a crank adjustment to a point where an indicator would designate "landing attitude," pull back his throttle and let the aeroplane do the rest. There are certain things, however, which make this difficult at this time and, under certain commercial operating conditions, will be difficult to meet in the future. This is qualified, however, by considering only existing practical high lift devices. Rates of descent beyond 12 or 15 ft. a second are going to be difficult to take care of except in a very awkward type of landing gear. A rate of descent of 12 ft. a second at or near maximum lift can only be accomplished at the present time with a lightly loaded aeroplane of clean lines and with flaps, or slots and flaps. As the wing loading is increased, the velocity along any given flight path very adversely affects the rate of descent and the total overall L/D of the aeroplane with retracted flaps must be very good in order not to have too steep an angular gliding attitude for

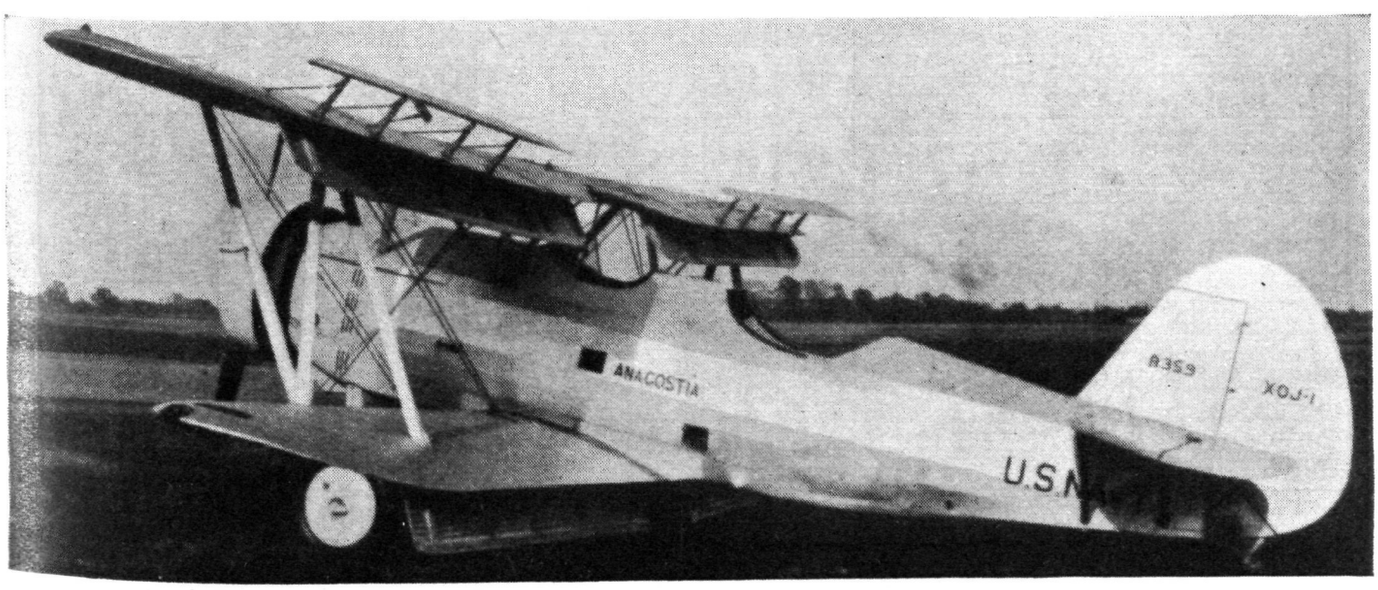


Fig. 14.—The XOJ.1 fitted with Zap Flaps and Ailerons

FIG. 15.

		Angle of lift increasing surface to basic airfoil	Flap chord in per cent of basic airfoil chord	Max. lift coefficient C_L max.	Speed range factor $\frac{C_L max}{C_D min}$	L/D at max. lift (2)	Angle of attack of basic airfoil at max. lift	Per cent improvement in lift		Per cent improvement in speed-range factor		Reference, N.A.C.A. report
								Over plain airfoil (1)	Over simple flap	Over plain airfoil (1)	Over simple flap	
Plain basic airfoil (1)				1.291	85.0	7.6	15°					T.R. 427
Simple flap		45°	30%	1.950	128.2	4.0	12°	51%		51%		T.R. 427
Slotted flap with cover plate		45°	30%	1.980	120.5	4.0	12°	53%	1.5%	42%	None	T.R. 427
Double slot and flap		45°	30%	2.442	117.5	4.0	16°	89%	25%	38%	None	T.R 427
Fixed slot, cut in basic airfoil				1.772	73.8	5.3	24°	37%	None	None	None	T.R. 427
N.A.C.A. fixed auxiliary airfoil, ahead of basic airfoil (3)		0°	14.5%	(3) 1.705	104.5	3.5 Approx.	24°	32%	None	23%	None	T.R 428
N.A.C.A. optimum fixed slot (3)				(3) 1.648	76.4		24°	27%	None	None	None	T.R. 400
Handley Page type automatic slot (3)				(3) 1.632	(3) 114.2 129 (5)		28°	26%	None	(3) 34.5% 52% (5)	None	T.R 400
Front slot and simple flap		45°	30%	2.182	91.0	3.8	19°	69%	12%	7%	None	T.R. 427
Front slot and slotted flap		45°	30%	2.261	93.2	3.8	19°	75%	16%	10%	None	T.R. 427
Triple slot and flap		45°	30%	2.600	87.3	3.8	20°	101%	33%	3%	None	T.R 427
Split flap, rotated down, no backward movement		50°	30%	2.16	138.5	4.3	14°	70%	10.7%	63%	8%	T.N 422
Split flap, trailing edge moved vertically downward (Zap)		60°	30%	2.35	150.8	3.7 Approx.	13°	85%	20.5%	77%	17.5%	T.N 428
Split flap, hinge point moved back to 90% of chord		54°	40%	(3) 2.222	(3) 142.2 161 (5)	3.8	13°	75%	14%	(3) 67% 89% (5)	(5) 11% 12.6% (5)	T.N. 422
Hall wing, front slot closed		48°	34%	2.08	138.8	3.6	13°	64%	6.7%	63%	8.1%	T.N. 417
Fowler wing, projected (area increased approx. 31% over basic airfoil) (3)		40°	40%	(3) 2.422	(3) 155.3 203 (5)	4.25	15°	90%	24.3%	(3) 83% 140% (5)	(5) 21.2% 59% (5)	T.N 419
Fowler wing with N.A.C.A. 22 slat and round nose of basic airfoil	14.5% chord	Slat −40° Flap +40°	Slat 14.5% Flap 40%	(3) 2.49	(3) (4) 137 (5) 199	3.76	21° to 25°	96%	28.1%	(3) (4) 61% (5) 134%	(3) 7% (5) 55%	T.N 459
N.A.C.A. 22 slat on plain wing with rounded nose	11.7% chord	Slat −45°	Slat 14.5%	(3) 1.78	(4) 97.7 (5) 114.2	4.8	30°	40%	None	(3) (4) 15% (5) 35%	None	T.N. 459

FIG. 15.—Table compiled by Richard M. Mock and published in *Aviation*, May and June issues, 1933. The Reynolds Number for all tests was 609,000.

(1) In comparing properties of modified sections with the plain basic section, the coefficients used in each case were obtained under similar test conditions. Drag coefficients were taken with slot closed (if movable) and with flap neutral.

(2) A low value of L/D at maximum lift indicates a steep gliding angle and consequently a short landing. An L/D of 8 corresponds to a gliding angle of approximately 7 deg., and a value of 3·5 means about 16 deg.

(3) Based on total wing area. Lift-increasing device extended and projected on original chord line. Actually this area is structural area necessary and forms the basis for the comparison with the simple flap.

(4) With slat and flap retracted the aerofoil is not perfect, having a drag coefficient of 0·0182 compared with 0·0156 for the plain aerofoil.

(5) Based on contracted area.

the particular wing loading. With a lightly wing loaded aeroplane, somewhere under ten or twelve pounds per square foot, and a good L/D, it is perfectly possible today to build a private or sport type aeroplane with Zap flaps that could be mushed into a landing without the necessity of the pilot redressing by touching the controls. When we get into the commercial transport field where high wing loadings are imperative from a standpoint of speed and pay load efficiency, it will be essential that the pilot use quite an amount of judgment in approaching the ground and in the following levelling off for landing. This condition will continue, in my opinion, until such time as we are able to create much higher lift coefficients than are practical today.

In this connection, it is interesting to compare the difference between the acute stalling of a Zap equipped aeroplane of twelve or thirteen pounds wing loading and that of an aeroplane of straight airfoil section with the same wing loading. When the latter type is acutely stalled, where the landing speed is around 55 to 60 miles per hour, there is a resultant dive from which the pilot does not attempt to recover until the aeroplane has reached a speed of at least 70 to 80 miles per hour. Because of the attitude of the plane in the downward plunge and the relatively horizontal attitude of the lift vector whose vertical component necessary to overcome the force of gravity is relatively small, the aeroplane must be allowed to traverse a considerable vertical distance in order that the lift vector may be acting efficiently in overcoming gravity. Any attempt to pull the plane out previous to this time is more or less injudicious, because the inertia of the plane at the speed of 70 to 80 miles per hour is so great as to cause a mushing action with a resultant angle of attack that might again put the aeroplane into a spin. Those of us who have seen the training that went on during the war in JN—4's aeroplanes, he arrives at the conclusion that the ability to raise and lower the flap quickly is almost as important as lateral control, particularly under forced landing conditions. In a number of practice forced landings, it has been found that it becomes necessary to alternately lower and raise the flaps to compensate for errors in judgment of gliding angle.

The importance of this can hardly be appreciated until one has attempted a forced landing under several varying wind conditions. For instance, when approaching a landing field under forced conditions, the flap is lowered and half-way down in the glide it is discovered that the wind is blowing quite rapidly and the plane will not make the field, it is extremely desirable to be able to wind the flaps up very quickly, pick up speed, extend the gliding angle until it is assured that the field can be made with safety. By the time this decision has been reached, the aeroplane, in most cases, is at a very low altitude right over the edge of the field, and, therefore, the flap must be brought into action again very rapidly. It can be seen that a flap requiring a high operating force necessitating too many turns of the handle is quite impractical for anything other than landings on normal aerodromes with full control of the engine and where there is ample time, and such a flap would be actually dangerous under forced landing conditions.

Many engineers have asked me of the spinning characteristics of Zap flaps, and in a recent controversy in one of the international aviation magazines a certain correspondent has claimed that the split flap should have very undesirable spinning characteristics. There are two things to offset to realise exactly what this means, because time and again students have been seen to spin for several hundred feet, stop the rotation, enter a dive and immediately go into a spin from the dive in the opposite direction. With a lightly loaded aeroplane, we shall say, of five to six pounds per square foot, which means a flying speed of approximately 40 miles per hour, in a similar stall, the aeroplane can be pulled out of its dive at 20 to 30 miles per hour less speed than under the first condition simply because the inertia is reduced as the difference between the square of two velocities, and being so much less the aeroplane can be brought to a level flying attitude with a considerable reduction in vertical descent. Because a flapped aeroplane also flies at a reduced rate, the inertia forces are consequently less, and therefore a stall is less dangerous when close to the ground, as it acts similar to the light wing loaded type.

There is a mass of additional data of a specific nature that might have been included, and the writer will be very glad to furnish this to those engineers who are further interested in the application of Zap flaps and ailerons to their particular designs.

TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any Bookseller.

EXPERIMENTS ON THE HAWKER HORNBILL BIPLANE. Part I.—FULL SCALE INVESTIGATION OF THE STABILITY OF THE HORNBILL AT THE STALL. By S. B. Gates, M.A., A. Ormerod, B.Sc., and R. A. Fairthorne, B.Sc. Part II.—FULL SCALE SPINNING TESTS OF THE HAWKER HORNBILL. By A. V. Stephens, B.A. Part III.—ROLLING EXPERIMENTS ON A MODEL OF THE HAWKER HORNBILL WINGS AND BODY. By H. B. Irving, B.Sc., and A. S. Batson, B.Sc. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1422. (19 pages and 13 diagrams.) August, 1932. Price 1s. 3d. net.

In view of the satisfactory flying qualities of the Hawker Hornbill aeroplane a great deal of research has been carried out on the full scale and on the model to investigate its properties from the points of view of stability, control and spinning.

The Hornbill has exceptionally good stability properties in stalled flight, but it does not reach the standard set by the use of automatic slots. The reason for its good qualities has not been discovered. The model values of its rolling derivatives at the stall are not superior to those of models of aircraft whose stability properties are much inferior to the Hornbill. To account for the Hornbill's superiority we must postulate either a large favorable scale effect on damping in roll or a happy adjustment between various derivatives such as Bryant's theoretical work has shown to be necessary for stability unless the damping in roll is unusually large. The shape of the Hornbill wing tips has been associated in other designs with stability properties rather above the average, and to test this point full-scale tests of the Hornbill with altered wing tips are in hand.

The Hornbill wing and body combination has exceptionally good properties as regards yawing moment (body axes) in the region of the flat spin.

DRAG AND PRESSURE-DISTRIBUTION EXPERIMENTS ON TWO PAIRS OF STREAMLINE BODIES. By C. N. H. Lock, M.A., and F. C. Johansen, M.Sc., A.M.I.Mech.E. R. & M. No. 1452. (19 pages and 4 diagrams.) March, 1933. Price 1s. net.

The interference between an aerodynamic model and the wind tunnel in which it is tested evidently depends on the shape of the model and on the relative size of the model and the tunnel. As a means of checking the theory of tunnel interference on symmetrical bodies put forward in R. & M. 1275*, and subsequently slightly modified in R. & M. 1451†, it was desirable to apply the theoretical corrections to experimental observations obtained over a range of conditions as regards the relation between size of body and size of wind tunnel. It was further desirable to check the validity of the theory as regards its application to bodies of different shapes. These several requirements involve measurements of drag and pressure distribution for two series of bodies of the same geometrical shape but to different linear scales and tested in wind tunnels of different sizes.

The measured values of drag are rather too scattered to be of much value as a confirmation of the small correction necessitated by tunnel constriction

* "The interference of a wind tunnel on a symmetrical body."—Lock.

† "Wind tunnel interference on streamline bodies: Theory and experiments."—Lock and Johansen.

effect. They are of more value as a check on the corrections for wind tunnel static pressure drop. A fuller analysis of the data in relation to tunnel interference theory appears in R. & M. 1451. In the present report the data are considered mainly as a contribution to existing information on the drag of streamline bodies. The degree of turbulence present in the boundary layer is found to have a marked effect on overall drag, but no appreciable effect on pressure distribution; whence it may be inferred that the appreciable scale effect observed with a completely turbulent boundary layer is to be associated with a decrease in skin friction coefficient as Reynolds number is increased.

For smooth, well-shaped bodies, the skin friction is closely the same as that on a flat plate of equal area.

SPINNING CALCULATIONS ON SOME TYPICAL CASES. By H. B. Irving, B.Sc., and A. S. Batson, B.Sc. R. & M. No. 1498. (26 pages and 12 diagrams.) February 20, 1932. Price 1s. 6d. net.

The calculations described in this report were made in pursuance of the conception that certain combinations of aerodynamic and inertial properties of an aeroplane should be good from the point of view of recovery from spinning; others bad. One is helped to understand how this comes about by considering the behaviour of a model which is free to rotate about a vertical spinning axis and is also pivoted about an axis in the body permitting it to yaw.

If the condition of the model is arranged so that the mass spread along the body is decidedly greater than the mass spread along the wings—*or, in* other words, if the difference, A-B, between the moments of inertia about *the longitudinal and lateral axes is negative—it will be found that when* the model is rotated about the vertical axis it will always tend to drop one *or other wing tip. Now, if weights are added to the outer parts of the wings* of the model until these preponderate over the body weights—thus making A–B positive—it will be found on spinning the model that it always tends to set its span horizontal.

Calculations were made on a thin wing (R.A.F. 15) biplane with 0° and 30° stagger, and on a R.A.F. 15 monoplane. The outstanding features of the different combinations are given in tabular form in the report.

Of these combinations, the one of most interest is perhaps that of wings stable in roll (0° yaw) with large negative A–B. In addition to giving a tendency towards a dangerous spin against the controls, it also has the following features:—

(1) May be worse with c.g. forward.
(2) May be better with floats.
(3) May be worse at low altitudes.
(4) Weathercock stability important.
(5) May be worse when C–A is small.
(6) Dihedral probably important.

The dangerous spin may be either flat or steep, the monoplane (thin wing) having the greater liability to the flat spin. Whether this is true of the thick wing-tapered monoplane is not known.

The case of stable wings and large positive A–B is also interesting in that good recovery is indicated when the elevators only are used. This case is almost certainly that of the Pterodactyl. The small value of the rolling moment due to sideslips for this aeroplane (Mark IV) should also be in its favour.

EXPERIMENTS ON THE REVERSAL OF AILERON CONTROL DUE TO WING TWIST. By W. J. Duncan, D.Sc., A.M.I.Mech.E., and G. A. McMillan, M.Eng. R. & M. No. 1499. (22 pages and 4 diagrams.) July 16, 1932. Price 1s.

Recently the question of loss of lateral control of aeroplanes due to the *wing twist which accompanies operation of the ailerons at high flight speeds* has come into prominence, more especially in relation to monoplanes with fabric-covered wings. The earliest theoretical study of the problem was made by Roxbee Cox and Pugsley,* who based their analysis on two-dimensional strip theory, and treated the wing as "semi-rigid." Slightly later, one of the present writers pointed out that the reversal speed could be expressed in terms of the aerodynamical derivatives of the theory of wing flutter.† More recently, Pugsley‡ has shown how the formulæ of the earlier theory must be modified when the aerodynamical reactions are deduced from the "Prandtl theory," while Pugsley and Brooke have shown§ that the flight speed for complete loss of lateral control of an elastic wing can be determined by a process of successive approximation. The present report gives an account of experiments which have been undertaken in order to test the theoretical formulæ, and to investigate the effects of some modifications of the wing and aileron upon the reversal speed.

The wing used in the tests was the light aeroplane wing previously used for experiments on wing flutter.‖ It is of reactangular plan form, of 9 ft. span and 3 ft. chord, and the spars are uniform. It was mounted horizontally as a cantilever in a wind tunnel, and the reversal speed was determined from observations of the flexural displacements at the tip and near the root corresponding to various wind speeds and settings of the aileron. The principal results of the tests can be summarised as follows:—

(1) The measured "reversal speed" for the wing without external bracing *is in good agreement with the reversal speed calculated by the method of* Roxbee Cox and Pugsley,¶ and with that deduced from the known values of the flutter derivatives.

(2) For a range of variation of aileron hinge position the change in the reversal speed was small.

(3) The reversal speed is highest when the aileron control operates at the inboard end of the aileron.

(4) Covering the aileron gap raises the reversal speed slightly.

(5) When the wing is externally braced at the inboard end of the aileron, the reversal speed is raised by a greater amount than would correspond to the increase of torsional stiffness as measured at the wing tip.

This result suggests that it will be advisable to select the "reference section" of the semi-rigid theory near the midspan of the aileron.

* "Loss of Lateral Control in Aeroplanes due to Elastic Deformation of the Wings."—H. Roxbee Cox and A. G. Pugsley. September, 1931.

† "Note on the Reversal of Aileron Control."—W. J. Duncan. September, 1931.

‡ "The Aerodynamical Characteristics of a Semi-Rigid Wing, relevant to the Problem of Loss of Lateral Control due to Wing Twisting."—A. G. Pugsley. May, 1932.

§ "The Calculation by Successive Approximations of the Critical Reserval Speed for an Elastic Wing."—A. G. Pugsley and G. R. Brooke. September, 1932.

‖ See R. and M. 1155, § 50. "The Flutter of Aeroplane Wings."—Frazer and Duncan. August, 1928.

¶ It is to be remarked that the distribution of twist under tip load for this wing is very nearly linear, as assumed in the simplest form of the theory.

The theoretical discussion leads to the following conclusions:—

(*a*) The reversal speed is proportional to the square root of the torsional elastic stiffness of the wing.

(*b*) The reversal speed is independent of the position of the flexural centre.**

(*c*) The reversal speed falls as the centre of pressure of the aileron load moves aft.

** This conclusion was first reached in Ref. 1. It is discussed at length in § 3 of the present report.

CALCULATIONS OF THE RESISTANCE DERIVATIVES OF FLUTTER THEORY. PART I. By W. J. Duncan, D.Sc., A.M.I.Mech.E., and A. R. Collar, B.A., B.Sc. R. & M. No. 1500. (14 pages and 2 diagrams.) October 8, 1932. Price 9d. net.

In R. & M. 1242,* H. Glauert has calculated the reactions upon a rectilinear aerofoil in two-dimensional accelerated motion in an infinite fluid when the influence of the vorticity in the wake is taken into account, and he arrives at results equivalent to those previously obtained by H. Wagner.† Glauert applies the general formulæ to find expressions for the force and moment upon an aerofoil performing a simple harmonic oscillation in pitch about a point in the chord which advances through the fluid with uniform velocity. In particular he examines the influence of frequency on the damping derivative for pitching motion. In the present paper the analysis is extended to the case where the aerofoil has two independent oscillatory motions, namely, a pitch and a translation at right angles to the general direction of motion. A complete set of derivatives is obtained which are the two-dimensional analogues of the flexural-torsional derivatives of the theory of wing flutter.

It is found that the values of all the derivatives are largely influenced by the frequency of the oscillation. Since the values of the derivatives depend on the frequency in a simple harmonic motion, they depend also on the logarithmic increment (or decrement) in a growing (or damped) oscillation. Explicit formulæ for the derivatives have also been found for the case of a non-oscilliatory divergence.

* "The Force and Moment on an Oscillating Aerofoil." March, 1929.

† "Uber die Entstehung des dynamischen Auftriebes von Tragflügeln." *Zeit. für angewandte Math. u. Mech.*, Vol. 5, p. 36 (1925).

TESTS OF FLOATING AILERONS ON A BRISTOL FIGHTER AEROPLANE. PART I. ROLLING BALANCE TESTS ON MODEL WINGS. By F. B. Bradfield, Math. and Nat. Sci. Triposes, and G. F. Midwood. PART II. FULL SCALE TESTS. By A. V. Stephens, B.A. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1501. (26 pages and 42 diagrams.) January 29, 1932. Price 1s. 9d. net.

*The following model experiments have been made in connection with full-*scale tests of floating ailerons of a Bristol Fighter. The port and starboard ailerons are interconnected in such a way that they have freedom to move in the same sense, while they are moved differentially by moving the control column. The port and starboard ailerons are constrained to float at a common setting when the column is central; and when the aeroplane has a rate of roll and the effective incidence varies along the wing, a mean floating angle is taken up.

At zero rate of roll, rolling and yawing moments and the floating angle of the ailerons were measured from $\alpha = 0°$ to 36°, for from $\pm 15°$ aileron angles. For a range of ps/V from 0 to 0·5, and angles of incidence from 2° to 60°, the same quantities were measured for aileron angles of 0° and $\pm 10°$, both with the ailerons floating and in the standard position.

Floating the ailerons reduces, but does not entirely eliminate, the auto-rotation range.

The aileron control with floating ailerons is better than with standard ailerons in that the yawing moment due to the ailerons is considerably less positive, but there is little increase in rolling moment, and under some conditions the rolling moment is less than for standard ailerons, being reversed in sign at a very large values of α when there is a rate of roll.

WIND TUNNEL TESTS ON A BRISTOL "BULLDOG" FITTED WITH A THIN TOWNEND RING. By W. G. A. Perring, R.N.C. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1504. (18 pages and 8 diagrams.) August 4, 1932. Price 1s. net.

The present report continues the investigation commenced in R. & M. 1413,* into the effect of a thin Townend ring on the performance of the Bristol Bulldog. The tests have been made on a one-fifth scale model representative of a single-seater Bristol Bulldog fitted with a Jupiter VII engine. Measurement of the drag of the model without airscrew, and the resultant of the thrust and drag of the model with airscrew have been made (*a*) for the model without ring, and (*b*) for the model fitted with a thin polygonal type of Townend ring, the tests being carried out for three angular settings of the ring.

Tests without airscrews showed that the drag reduction due to the ring was greatest with the ring at −9°, was slightly less for a ring angle of −6°, and was approximately one-half the best value when the ring angle was −3°. The addition of the slipstream had only a slight effect on the drag reduction due to the ring at −6° and −9°, when the conditions corresponded to those for level flight, but it improved the performance of the ring when this was at −3°. The tests also showed that the addition of the ring had practically no effect on the airscrew torque.

The tests result in a predicted rate of climb of 460 ft. per minute, compared with 360 ft. per minute achieved full scale; the difference between model and full scale being probably partly, or wholly, due to a difference in the scale effect with and without the ring. The tests also show that the performance of the full-scale aircraft might be improved by a further 10 per cent. of the improvement already achieved if the ring full scale was changed through 3° to a larger negative angle.

* "Some wind-tunnel experiments on the cowling of air-cooled engines."—Perring.

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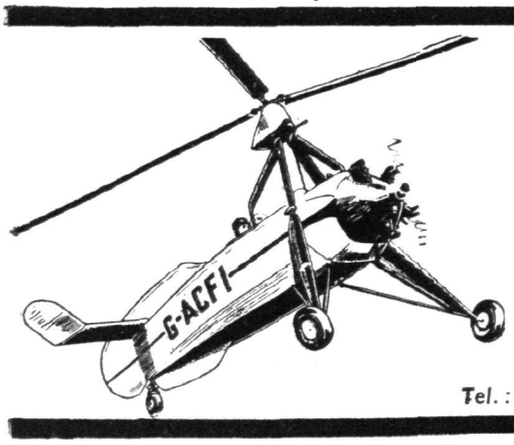

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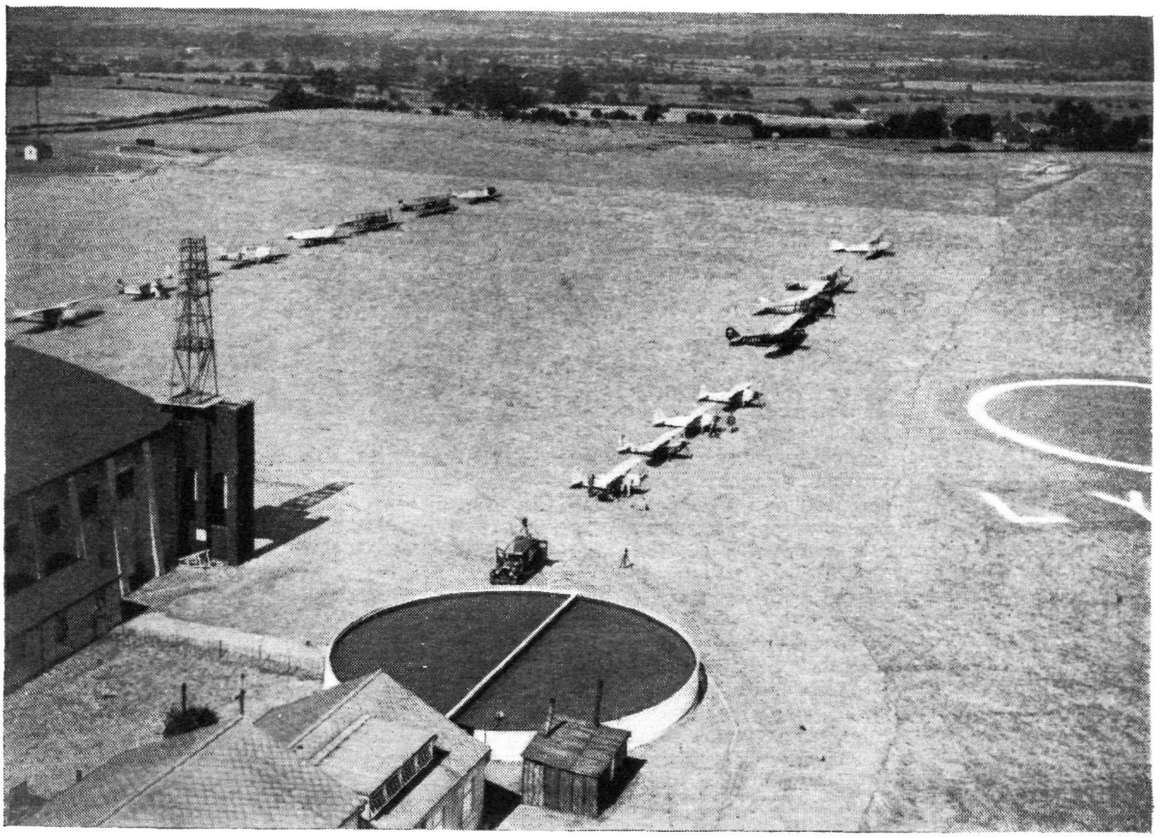


The aeroplanes lined up for the two heats of the Folkestone Aero Trophy Race. Six Comper " Swifts " took part. (FLIGHT *Photo.*)

FOLKESTONE AERO TROPHY RACE

SEVENTEEN aeroplanes started from Lympne in nearly perfect weather for the second race for the Folkestone Trophy. They were divided into two heats, as can be seen from the tabulated results.

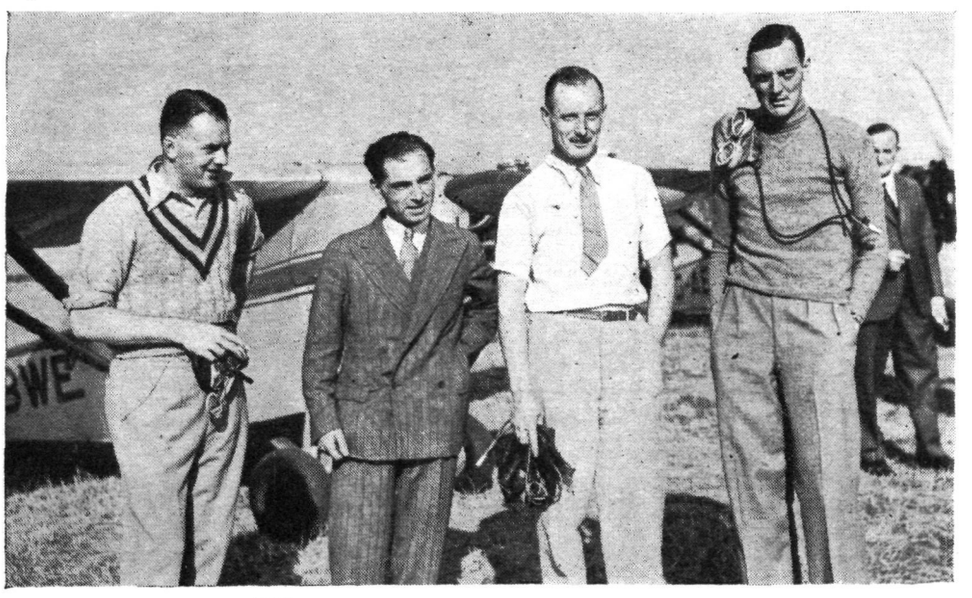
The race was run by the Cinque Ports Flying Club, and was the only event of the afternoon, no flying display being arranged as there had been the International Meeting only a few weeks before.

The course was a triangular one, with the finish arranged at the Victoria Pier in the middle of the third lap. This therefore provided variety for the competitors by virtue of the number of corners. The start was at Lympne airport, with the first turning point at Capel, around the airship shed. From there the machines had to fly outside the Harbour Pier to a pylon 400 yards east of the Imperial Hotel at Hythe, passing the head of the Victoria Pier in so doing. Then they had to fly straight back to Capel and round the course again.

This was the second year the race has been run. Last year it was won by Mr. " Bill " Styran on a Comper " Swift " (" Gipsy III " engine) which was entered by Mr. I. McGilchrist.

The start was uneventful except for Mr. Brembridge. This unfortunate pilot was the victim of someone who left chocks under his wheels, with the result that he nearly put his " Moth " on its nose when he opened up to take off. Apart from this *contretemps* things went smoothly and to programme.

Practically all the machines are well known to our readers, as they have for the most part raced before many times. In the first heat an aged Bristol Fighter was of interest. This has been acquired by Mr. K. K.



(Right to left) : K. Waller, K. K. Brown, T. Lipton and H. B. Davis. They finished the race in this order. (FLIGHT *Photo.*)

The lot of a judge was a happy one on Saturday. Mr. Duke basks between the heats.
(FLIGHT *Photo.*)

FOLKESTONE AERO TROPHY, AUGUST 26, 1933

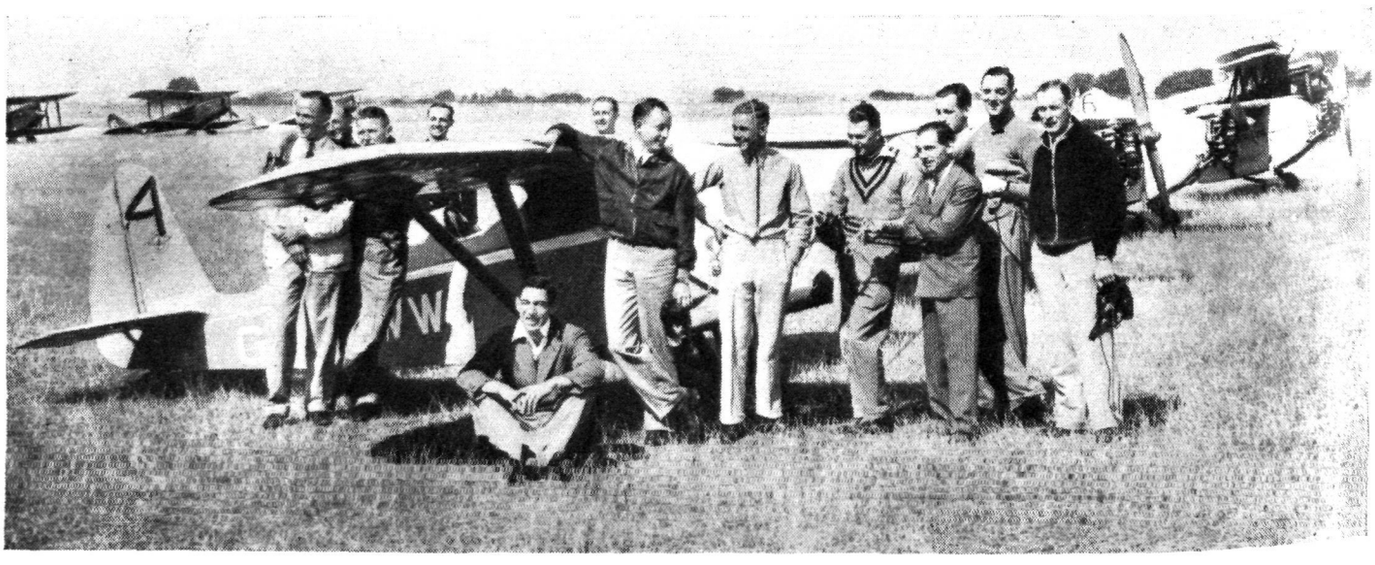
Entrant	Pilot	Machine and Engine	Markings	Racing No.
R. O. Shuttleworth	Entrant	"Swift" (Pobjoy)	G-ABWE	2
I. McGilchrist	W. Styran	"Swift" (Gipsy Major)	G-ABWW	4
W. E. Davis and K. Waller	K. Waller	"Moth" (Gipsy I)	G-ABOG	5
K. K. Brown and A. Wilson	K. Brown	Bristol Fighter (Falcon)	G-ABYT	6
Sir Philip Sassoon	Flt. Lt. J. Hawtrey	"Gull" (Javelin)	G-ACGR	8
Nigel Tangye	Entrant	"Swift" (Pobjoy R)	G-ABPR	9
L. Cliff	,,	"Moth" (Gipsy I)	G-AAVV	10
T. Lipton	,,	"Moth" (Gipsy III)	G-ABVW	11
L. Sparrow	,,	"Avian" (Hermes II)	G-AAYU	12
A. H. Cook	,,	"Swift" (Pobjoy)	G-ABUA	14
A. Henshaw	,,	"Swift" (Pobjoy)	G-ACGL	15
P. Randolph	,,	"Avian" (Hermes II)	G-AACV	16
C. F. Almond	,,	"Cadet" (Genet Major)	G-ABXW	17
H. Probyn	,,	"Hawk" (Cirrus III)	G-ACHJ	18
M. D. L. Scott	,,	"Puss Moth" (Gipsy III)	G-ABOF	19
R. A. Brembridge	,,	"Moth" (Gipsy I)	G-AAHP	20
Comper Aircraft, Ltd.	Capt. D. Davis	"Swift" (Pobjoy)	G-ABUU	21

Commander S. Deacon, who is in charge of Lympne Airport for the Air Ministry.
(FLIGHT *Photos.*)

Brown, the Club's instructor, and Mr. A. Wilson. Its Rolls-Royce "Falcon" engine pulled it along at 113¼ *m.p.h. in the final, when it came in second.* Wing Com. H. Probyn's Miles "Hawk" ("Cirrus III") was naturally a centre of interest, as it was with this same machine that he won the Wakefield Cinque Ports Cup at the last Lympne meeting. This time his machine looked considerably different as, not only has he had it finished rather beautifully, but also had the coupé top from a "Moth" put over the cockpits. Unfortunately his engine overheated—possibly due to the exhaust silencing arrangement which has also been added—during the race, so that he had to land at Hawkinge without finishing the course. Another who did not finish was Mr. P. Randolph. He missed the Hythe turning point in his "Avian" on the first lap. He continued round for another lap, but then turned off and landed back at Lympne.

The race was satisfying from the handicappers' point of view, although the result, good as it was, might have been much better had the wind not dropped quite considerably during the race. This had the effect of shortening the course and favouring the slower machines. The winner certainly had something "over" the handicappers, while the second and third were comfortably ahead, but the remaining seven machines were very close together. Actually we have not seen such an exciting bunch at the end of the race for a very long time. All these machines seemed to round the Harbour Pier together and then to jockey each other for places. If it is tight finishes the public want in air racing, then they certainly got it from Messrs. Dancy and Rowarth this time. Two of the aircraft were considerably faster than the others. These were the Comper "Swift" ("Gipsy III") which was flown by Mr. Styran and started scratch. He averaged 155½ m.p.h. The other was the Percival "Gull" (Napier "Javelin") owned and entered by Sir Philip Sassoon and flown by Flt. Lt. J. G. Hawtrey. This is the same machine, with a magnificent pale blue finish, which was raced in this year's King's Cup Race. The speed was

Mr. F. Rowarth pleased with the result of the race. Capt. Dancy and himself did the handicapping.



A group of the competitors before the race. (FLIGHT *Photo.*)

somewhat below that which we generally expect from this type, and the pilot was not able to cope with his handicap.

The judges, who took their stand on the end of the Victoria Pier, were Flt. Lt. J. T. Jones, Sqd. Ldr. A. L. Paxton, Capt. L. A. Braddell, the Mayor of Folkestone (Ald. J. W. Stainer), and Mr. — Duke. Excellent prizes were given to the winners. The first received a cheque for £50 and the right to hold the Folkestone Aero Trophy, presented by Mr. W. Bentley, for one year. The second gained a cup and £25, and the third a silver plaque and £10, Auto Pilots, Ltd., and Maj. C. Murfitt being the donors of the last two prizes.

As can be imagined, the finish was the signal for much jubilation on the part of Club members. Mr. Ken. Waller owns the winning machine jointly with Mr. Eric Davies, the manager of the Cinque Ports Flying Club, which fact in itself was enough to make most members glad, but when it was seen that Mr. K. K. Brown—the Club's popular instructor—was coming in second with the Bristol Fighter, owned by himself and Mr. Tony Wilson, the excitement began to break bounds. It only needed the assurance that Capt. Duncan Davies himself was running into fourth place to send the spectators connected with the Club into hilarious whoopee. Naturally their exuberant spirits were biased, but nevertheless everyone will be glad that it was really a Club-cum-Brooklands day. It was a fitting recompense to them for the hard work they had put in in organising the race.

HEAT I.

Racing No.	Pilot.	Handicap Allowance.	Finishing Time.	Speed.	Place.
		m. s.	m. s.	m.p.h.	
6	Waller	8 46	22 21	100½	1
12	Sparrow	6 50	23 11	106	5
6	Brown	6 27	22 53	109½	2
17	Almond	5 32	23 34	110½	8
14	Cook	4 42	23 14	117½	6
21	Davis	4 01	22 54	124	3
15	Henshaw	3 35	23 06	125⅝	4
4	Styran	Scratch	23 15	155¼	7

HEAT II.

10	Cliff	8 39	23 02	97¾	5
16	Randolph	7 26	Retired	—	—
20	Brembridge	6 27	22 44	109½	2
18	Probyn	5 32	Retired	—	—
11	Lipton	4 52	22 38	119½	1
2	Shuttleworth ..	4 42	23 07	117½	6
9	Tangye	4 42	22 55	118⅞	4
19	Scott	3 48	22 54	124½	3
8	Hawtrey	0 51	23 16	145½	7

FINAL.

5	Waller	8 46	21 52	103	**1**
10	Cliff	8 39	22 48	99¼	9
12	Sparrow	6 50	22 47	108	8
6	Brown	6 27	22 10	113½	**2**
20	Brembridge	6 27	22 44	110½	5
11	Lipton	4 52	22 21	122	**3**
9	Tangye	4 42	22 54	119½	10
21	Davis	4 01	22 35	126	4
19	Scott	3 48	22 45	126½	6
15	Henshaw	3 35	22 46	128	7

BROOKLANDS

The favourable weather has enabled flying to be carried on from early morning to dusk, the total for the week being 65 hr. dual and 40 hr. solo. New pupils include Messrs. Mitton, Barnes, Scriven, Jube, Makley, Pitt and Hancock. Lady Clayton flew to Holland during the week, Capt. Findlay piloting the machine back to Brooklands the next day. He also flew Mr. Fred Darling from Beckhampton to Petworth. Brooklands Airways have been exceptionally busy, the Junkers having left daily for Le Touquet and Deauville, and the "Puss Moth" several times for Le Touquet and Yeovil. Mrs. Battye has been having dual on her own "Gipsy Moth," and Maj. Empson has started instruction on his Bristol Fighter. Cross-country flights were done by Messrs. Stevens, Pawson and Huggins, who visited Portsmouth, Shanklin, Bristol, Norwich and Lympne.

HANWORTH (N.F.S.)

Flying hours for the week totalled 90. The outstanding feature of the week has been the time in which Mr. Kendall has qualified for an "A" licence; he did it in 8 days. Mr. Kendall is a cattle dealer from South America, and has learned to fly that he may use this method of getting about his business. Mr. D. W. Llewellyn, who learned to fly at Hatfield, flew over to Hatfield on Saturday, August 19, to be examined for his Instructor's Certificate, and was successful. Cross-country flights were done by Mr. Back to Shoreham, and Mr. Badbe dual with Capt. Wilson. Mr. J. G. Peel, chairman of N.F.S., Ltd., stayed at Hanworth for the annual general meeting of the company. On Saturday, August 19, a party from the Middlesex section of the Cyclists' Touring Club spent an afternoon at Hanworth, being shown over the works and being given joy-rides. Herr Hans Ulrich Nebele, a young German pupil, successfully carried out his first solo. Mr. C. Fuller flew to Rome and return during the week. The Inca Aviation Co. left Hanworth for Blackpool on Wednesday, August 16, to carry out some advertising flights. The workshops have turned out five privately-owned machines during the week after repairs and overhauls. Several machines are in for C. of A., including Lord Douglas Hamilton's "Gipsy Moth." The chief engine inspector recently returned from the Isle of Man, where he had been inspecting a flying boat belonging to British Flying Boats, Ltd. An engine was removed and brought to Hanworth for complete overhaul; an engine loaned by Messrs. Ford, Ltd., was installed in its place.

YORKSHIRE AEROPLANE CLUB

About 25 hr. were flown during the week. Mr. S. D. Goldthorp has passed his tests for an "A" licence, and Mr. L. A. Booth has joined the Club as a flying member. Visiting aircraft included a Cirrus "Moth" and an Avro "Avian" belonging to N.F.S., a Comper "Swift," a "Gipsy Moth," a Percival "Gull," and a "Puss Moth" of Hillmans Airways. Flights have been made to Stoke, Scarborough and London, and two private owners intend to fly to Austria shortly. The taxi rates at Yeadon have lately been reduced.

NORFOLK AND NORWICH AERO CLUB

The following received instruction last week: Messrs. H. E. Crichton Boxer, F. W. Rushmer, W. G. Watson, H. H. Wilson, and A. R. Cox (refresher). Soloists were Messrs. S. Hansel, H. C. Stringer, A. J. Sayer, A. J. S. Morris, H. H. Wilson, W. G. Watson, W. O'Brien, H. Birchall, A. A. Rice, C. C. White, A. R. Kirby, E. V. Goodhill and Miss W. F. Hudd. Two pupils did first solos, Messrs. W. G. Watson and H. H. Wilson. Visitors last week included Capt. Thorn in a "Fox Moth," a D.H. "Dragon" of Messrs. Hillman which took a party of wireless experts to the Radio Exhibition at Olympia from Norwich, Dr. Gregory in a "Gipsy Moth" from Heston, and Mr. Ashworth also in a "Gipsy Moth" from Nottingham. Pilot members of the Club who complete 12 hr. in the 12 months from May 1 of this year will be entitled to 1 hour's free flying. The Club's annual Garden Party will be held on Saturday, September 2, at which there will be various competitions, followed by a treasure hunt and dance in the evening.

MAIDSTONE FLYING SCHOOL

The Maidstone Flying School has been seriously handicapped during the past week by a slight mishap to their "Gipsy Moth," G-ABAI, but it is hoped it will be serviceable by next week. The usual Sunday dance was held, and is now becoming an established feature. On Sunday, September 3, from 7.30, there will be a special Gala Dance, with entertainment by London artistes.

READING AERO CLUB

Flying times for the week totalled 54 hr. 15 min. "A" licences were obtained by Capt. Hamilton, Messrs. W. Storm-Clark, G. Westerman and Martindale. New pupils were Messrs. R. Wright, E. A. Boyd, and C. H. Woodhouse, Capt. Gilbert, who was flying during the war, has joined the school, and went solo after 1 hr. dual. Miss Frost, whose "Moth" was recently given a new C. of A. by the works, arrived from Paris on Thursday, August 24. Paramount Sound News filmed views of the Miles "Hawk," both aerial and ground; one of these machines has been delivered to Mr. F. D. Bradbrooke.

THE SOUTHEND FLYING CLUB

Flying instruction was in full swing over the week-end August 19-21 in an Avro "Avian," which is being used while the "Moth" is undergoing its overhaul for a C. of A. Visiting planes on Sunday included "Puss Moths" from Hanworth, Mr. Newman from Heston, Mr. Macloughlan from Hatfield, Mr. Brian Allan in an "Avian" from Heston, and the East Anglian Club's "Moth." On Tuesday, August 15, Sir Alan Cobham's Air Display paid a return visit.

ALEXANDRIA FLYING CLUB

ALI BEY YEHIA, who obtained his "A" licence with Misr-Airwork recently, is President of the recently-formed Alexandria Flying Club, which has put in much useful work during the week-ends under the instruction of Misr-Airwork pilots. A permanent aeroplane, instructor and engineer are being sent this week to Dekheila for the flying school, which will be open to all Alexandria residents, whether or not members of the Alexandria Flying Club.

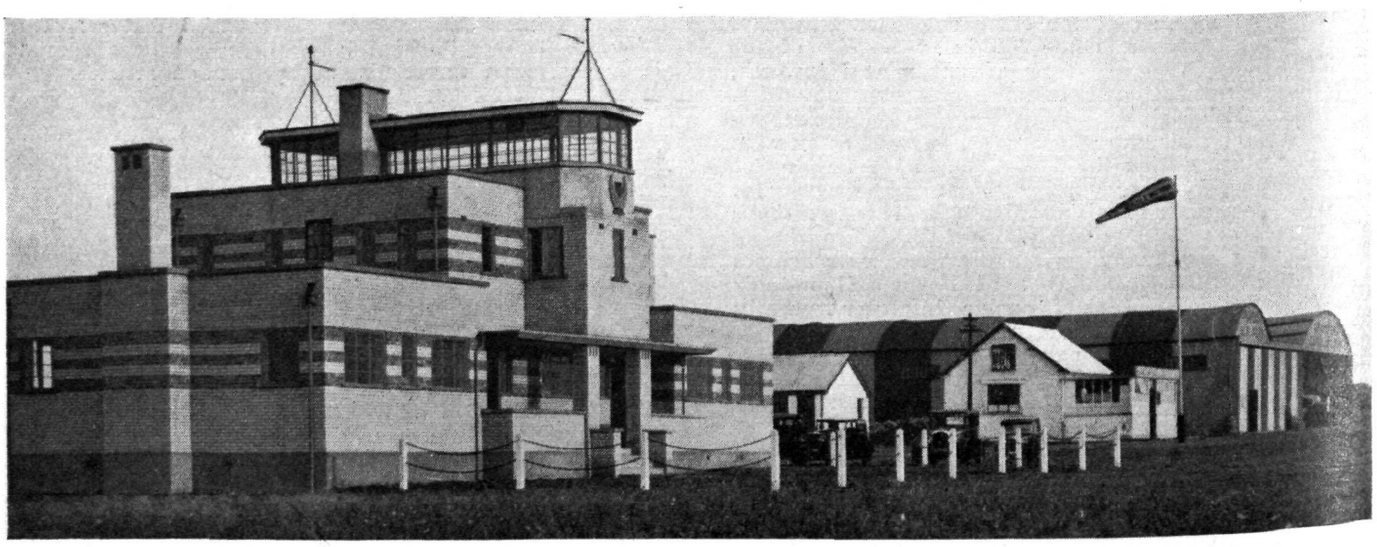
DELHI FLYING CLUB

The flying times for the last quarter totalled 281 hr., which does not compare too well with the 582 hr. flown in the previous quarter. The club was, however, handicapped by the hot weather and by only having one machine serviceable. Congratulations are due to Messrs. P. D. Mitton and L. P. Jaiswal on carrying out first solos, and to Messrs. Ravinder Hari Darshan Singh, an "A" pilot of the Club, and Gurdas Ram Sharma, a pupil under training, who have been selected as cadets for the R.A.F. College, Cranwell. Only two cross-country flights were done during the quarter: Mr. Balbir Singh flew to Patiala and Mr. O. N. Dang to Loharu. Mr. Grant Govan's machine was used on a number of occasions, but developed a reluctance to register sufficient oil pressure and would not be comforted by even the ministrations of Mr. Goodley. At the invitation of the Maharaja, Capt. Riley and the Hon. Secretary flew to Dholpur aerodrome on April 9 to report on the aerodrome. From the number of joy-rides which Capt. Riley was called upon to give, the State appears to have developed a high air sense. His Highness intends to convert the existing buildings on the aerodrome into a palatial Rest House, to which all visiting pilots will be welcome. Owing to one machine having come to grief near Lucknow and two having been handed over to the U.P. Flying Club, the Club were left with only two, and one of these, a "Bluebird," was put out of action in the first week in April; a cable order was sent to England at once for the necessary part, and a reminder in June, but still the necessary part did not arrive—[which is a great pity, for that is where the American manufacturers score—Service—EDITOR]. The Club much regrets to record the deaths of two well-known members of the Club. Capt. H. O. C. Bland, who was killed as the result of a motor accident near Quetta, was one of the original members of the Club, and rendered great service as Secretary during a critical time in the Club's history. Sadar Bahaeur Dharam Singh, who died last month in Europe, was a Vice-Patron of the Club, of which he was a staunch supporter. The Club's motto for pilots: "One is always safe in doing good turns."

LONDON GLIDING CLUB

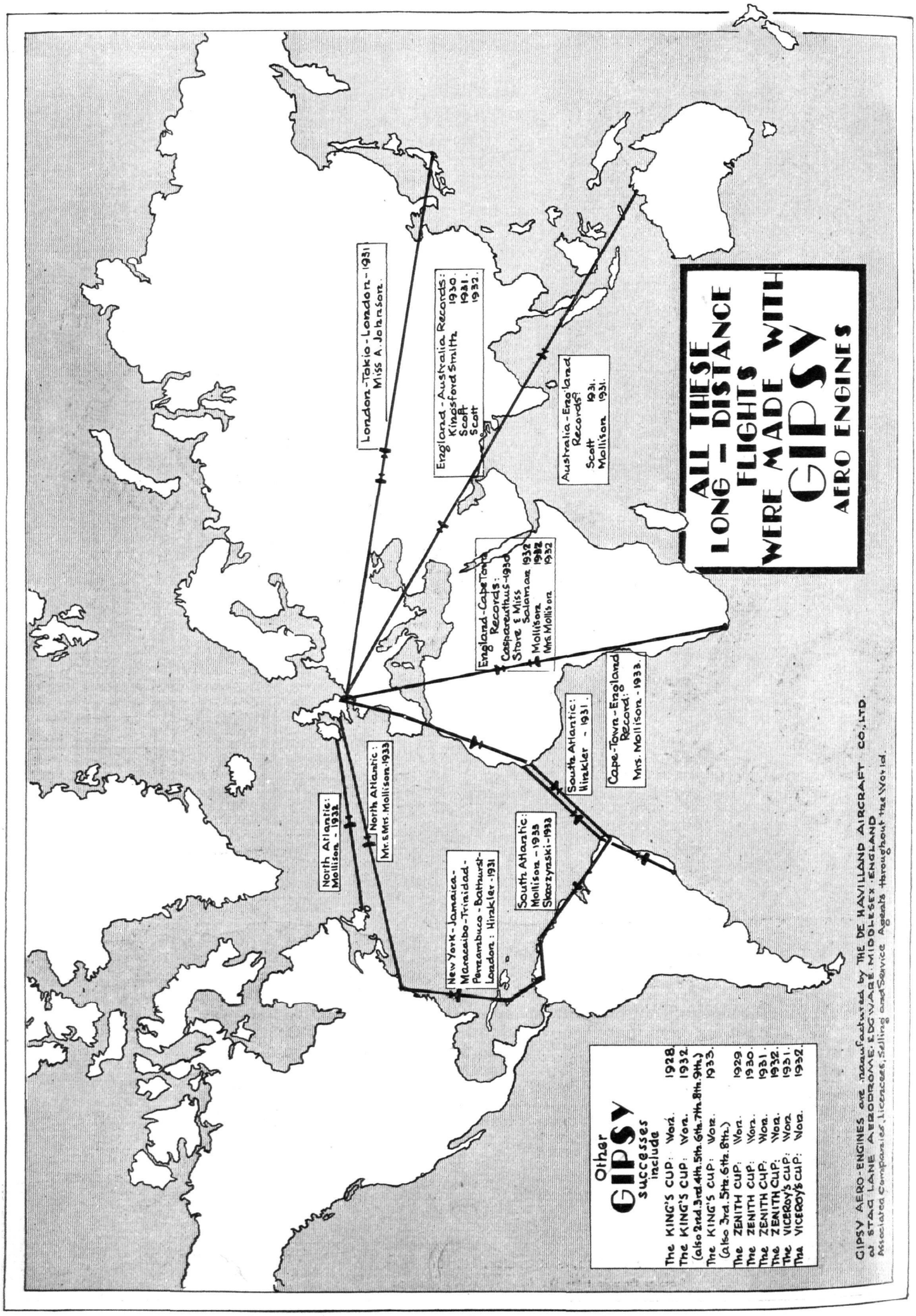
Thirty-one hr. were recorded for the week. On Monday, August 21, the "Professor" was given a long spell of ridge-soaring; the "Prüfling" soared twice before the 15 m.p.h. wind faded away. On Tuesday the "Professor" and "Prüfling" made three lengthy flights. Collins reached 1,450 ft. in the "Professor," rounding Totternhoe Church. On Wednesday Collins made a flight which is probably an English distance record. In a wind of about 12 m.p.h. he was launched in the "Professor" by means of the motor winch from the foot of the hill and cast off at about 400 ft. He then flew above the ridge for 3 hr. 10 min., awaiting the better conditions which had been forecasted by the Air Ministry. He got up to 700 ft., and when the clouds broke he managed further to gain height by convection currents until he was at 1,100 ft., after which with the help of clouds he got to 1,500 ft. While over Dunstable he saw a tern soaring strongly and so followed it. He was justified, as he found a very strong up current, reaching at times a velocity of 12 ft. per sec., and was soon at 2,200 ft. He then turned and made for Ivinghoe Beacon, which he reached without loss of height, and so turned down wind down the Gaddesden Valley and made for Hemel Hempstead, losing height all the way and arriving there at only 400 ft. Over Abbots Langley he found a good thermal current and was able to climb to 1,200 ft. Still flying down wind he finally landed half a mile from Bignell's Corner, near Barnet. The direct distance being 22 miles and the actual course followed taking him over 28 miles. He went up at 10.35 a.m., was over Ivinghoe Beacon at 1.50 p.m., and landed at 2.15 p.m. It is interesting to know that Collins has never flown a power-driven aircraft, and has learnt all his flying, *ab initio*, at the London Gliding Club. Buxton in the "Scud" reached 1,000 ft., but did not leave the ridge. Bell obtained his "B" certificate in a Dixon primary glider presented by Derby Slater. On Thursday the photographers were chasing Collins, so he soared in the "Professor" close to their cameras. On Friday primary training was curtailed by a dog, which bit the flying wires as the machine took off. The "Prüfling" ground-hopped. On Saturday primary training, "Prüfling" ground-hops, and a winch-launch for the "Kassel 20." On Sunday primary training, and several winch-launches for the "Kassel 20."

As the autumn approaches, the violent thermal currents will presumably fade away, but by then the club members will have had plenty of fun out of them. The trick of utilising the upheavals is being gradually mastered, especially now that D. F. Dent has invented an inexpensive variometer which functions perfectly. Pilots are also learning how to handle all the machines really nimbly, so that tight circles can be flown immediately a machine enters a small area of abnormal lift. An additional aid is the winch built by L. A. Desoutter, by which machines can be launched from the foot of the hill to a height where up-currents exist. Large launching crews are thereby rendered unnecessary, and flying can be carried out when only a pilot, winch-driver and assistant are present. All these things make the future look particularly bright.



AT GRAVESEND: The club-house and hangars of the Gravesend School of Flying.

Save time by using the Air Mail.


ALL THESE LONG-DISTANCE FLIGHTS WERE MADE WITH GIPSY AERO ENGINES
London-Tokio-London-1931 Miss A. Johnson.
England-Australia Records: Kingsford Smith 1930. Scott 1931. Scott 1932.
Australia-England Records: Scott 1931. Mollison 1931.
England-Cape Town Records: Cobham 1930. Stone & Miss Soloman 1932. Mollison 1932. Mrs. Mollison 1932.
Cape Town-England Record: Mrs. Mollison-1933.
South Atlantic: Hinkler-1931.
South Atlantic: Mollison-1933. Skarzynski-1933.
North Atlantic: Mollison-1932.
North Atlantic: Mr. & Mrs. Mollison-1933.
New York-Jamaica-Maracaibo-Trinidad-Pernambuco-Bathurst-London: Hinkler-1931.
Other GIPSY successes include
The KING'S CUP: Won. 1928.
The KING'S CUP: Won. 1932. (also 2nd. 3rd. 4th. 5th. 6th. 7th. 8th. 9th.)
The KING'S CUP: Won. 1933. (also 3rd. 5th. 6th. 8th.)
The ZENITH CUP. Won. 1929.
The ZENITH CUP. Won. 1930.
The ZENITH CUP. Won. 1931.
The ZENITH CUP. Won. 1932.
The VICEROY'S CUP. Won. 1931.
The VICEROY'S CUP. Won. 1932.
GIPSY AERO-ENGINES are manufactured by THE DE HAVILLAND AIRCRAFT CO., LTD. at STAG LANE AERODROME, EDGWARE, MIDDLESEX, ENGLAND
Associated Companies, Licensees, Selling and Service Agents throughout the World.

TAKING STOCK

Annual Report of A.R.C.

THE Report for 1932-33 of the Aeronautical Research Committee was issued last week, and is signed, for the first time, by Col. H. T. Tizard as chairman of the Committee, Sir Richard Glazebrook having retired in April last. As in previous years, the Annual Report is divided into two parts, the report of the Committee and a supplement, which deals at somewhat greater length with the work of the different sub-committees, panels, etc. The Report is published by H.M. Stationery Office at 2s., and is well worth that small sum, as it gives a very good *résumé* of the state of aeronautical knowledge as it exists to-day.

The Report pays a warm tribute to the services which Sir Richard Glazebrook has given as chairman of the Aeronautical Research Committee since its formation in 1920, and as chairman also of the Advisory Committee for Aeronautics which preceded the A.R.C. Sir Richard was chairman of the older committee from 1909, so that he has been closely connected with the art and science of aeronautics from its beginning to the present time, and has been responsible for advising the Government on aeronautical research for an unbroken period of 24 years.

The Report points out that in last year's Report the A.R.C. was able to refer to the attainment of the world's speed record by a Supermarine-Rolls Royce S.6B seaplane, and that during the past year two other important records have come to Great Britain, the altitude record established by C. F. Uwins on a Bristol "Pegasus"-engined Vickers Vespa, and the long-distance non-stop record by Gayford and Nicholetts in the Fairey (Napier). It is somewhat unfortunate that no reference is made in the Report to the fact that two of the three records, the speed record and the long-distance record, have since been wrested from us, the one by Italy and the other by France. However, an annual report does not lay claim to being a newspaper, and so perhaps this omission is excusable, although Agello established the new speed record as long ago as April of this year.

On the subject of equipment, the Report records that the main structural members of the new 24-ft. open-jet wind tunnel have been erected at the R.A.E., and that the tunnel is likely to be completed by April, 1934. This tunnel, it may be recollected, is being constructed by Boulton & Paul, Ltd. A new high-speed open-jet tunnel, 9 ft. by 7 ft., has been built at the N.P.L., and approval has been given for the construction of a second tunnel of similar size and design. Air speeds up to 140 m.p.h. will be attainable in these two tunnels. The 5-ft. open-jet tunnel at the R.A.E. has been modified so as to make speeds of 210 m.p.h. attainable.

A number of technical problems have been overcome in the operation of the compressed air tunnel, for which Mr. Relf has designed a balance on novel lines, consisting of a complete ring surrounding the jet and screened from it, and to which the model is rigidly attached, the forces on the model being transmitted to the ring, and measured by what is in effect a Kelvin current balance. The accuracy of the balance is such that forces from ½ lb. to 1,000 lb. can be measured to 1 per cent.

The new seaplane tank at the R.A.E. has been completed, and work is now being carried out on ascertaining the effect of the walls and depth of water on the model results. One of the first problems to be investigated will be the phenomenon of "porpoising."

Aerodynamics

The subjects of flutter and buffeting are referred to in the Report, and it is stated that the general problem of flutter of wings and tail units is now well understood, but that many difficulties arise in practice in the strict application of preventive measures to particular designs. As the general level of speeds increases it becomes more important to overcome these difficulties, and a good deal of further detailed work will therefore be necessary. Reference is made to a particular flutter problem which arose during the year in connection with the servo rudder of a certain aeroplane. Theory indicates that in this instance mass-balancing of the servo flap will overcome the difficulty.

"Buffeting" was a term invented by the A.R.C. shortly after the Meopham aeroplane crash, and is intended to describe the violent movement of the tail structure which can be caused by eddies from the wing. The purist might argue that the worthy A.R.C. has been guilty of confusing cause and effect, since the violent movements of the tail are obviously an effect and not a cause, while the cause of this movement is the buffeting which the tail may receive. However, the term has been officially adopted, and we must accept it—even if it be under protest.

It is stated that an interesting memorandum was received from Mr. Hollis Williams, of the Fairey Aviation Co., Ltd., which gave an account of some flights in two large cantilever monoplanes built by the Fairey Company. In these flights violent longitudinal oscillations were encountered. In one instance this was found to be due to the effect of opening a cabin window in the form of a flap on the upper surface of the centre section of the wing [presumably this refers to the long-range monoplane.—EDITOR]. In the second it was attributed to the effect of baffle plates in the cowling system of the two wing engines. [One imagines that this reference is to the Fairey monoplane night bomber.—EDITOR.] In both instances the wing section was very thick, and after discussion with Mr. Hollis Williams it was concluded that the trouble was due to the effect on the tail of premature stalling of the wing. Wake research, to determine the nature and magnitude of the effect of the wake on the tail, has been in progress, using aerofoils of R.A.F. 15 and R.A.F. 34 section. The effect of a sudden increase of wing incidence showed that it was unlikely that specially severe buffeting would follow such a change. [This is interesting in view of the conclusion reached after the Meopham crash that tail buffeting was probably the cause.—EDITOR.] More recent English wind-tunnel measurements of the tail buffeting of a Junkers F. 13 ge model lead, the Report states, to the result that the amplitude of the buffeting are considerably smaller, due to airscrew, etc., than those given in the English report on the Meopham accident. There is, however, good agreement between the latest English and the corresponding German results. [It may be recollected that at the time FLIGHT expressed doubt about the probability of the English hypothesis, and that later the German report also disagreed with the official English report. The A.R.C. might, without "losing face," have been frank enough to admit, in its annual report, that R. & M. 1360 may now be open to a certain degree of mistrust.—EDITOR.]

Of spinning, the Report says that the knowledge of the subject is considerably more definite than it was a few years ago—[it always has been—EDITOR]—and has been helped by the vertical wind tunnel at the R.A.E. An outcome of work with this tunnel has, it is stated, been that it has been discovered that the slots of a slotted wing may cause difficulties in a flat spin.

Under the heading Performance the Report makes mention of the system introduced by Professor B. Melvill Jones of attaching tufts of wool to the surface of an aeroplane wing and watching and cinematographing the behaviour of the tufts during flight. When the air flow is steady the tufts lie along the surface, but when the flow becomes turbulent they wave violently about or point up-wind. A recent report by the R.A.E. suggests that wool tufts provide most information and are simplest and quickest to use.

While on the subject of performance, it should be pointed out that the Report has some very interesting references to the Schneider Trophy machines of 1931. The Aerodynamic Sub-committee, it is stated, has had before it two valuable reports, one by Wing Com. Orlebar, on the seaplanes themselves and another, by Mr. W. L. Cowley, on wind tunnel tests on models at the machines. In general it was found possible to cure all vices, with one exception, by extensive wind tunnel tests on quarter-scale models. The one exception was the longitudinal instability of the S.6 A and S.6 B at the moment of taking off. Careful handling was then needed to keep the nose up and to maintain the angle of attack of the wings. Airscrew efficiencies of over 80 per cent. were obtained with airscrews of a P/D ratio of about 2, and with tip speeds near to the velocity of sound.

The Report has some interesting information about the

effects of diving in establishing high-speed records. It states that Flt. Lt. G. Stainforth attained in his speed record flights an increase in speed which was of the order of that calculated, and points to the very high standard of skill on the part of the pilot in question. It is stated that the excess speed obtainable at the end of a dive —[within the rules prescribed for high-speed records presumably—EDITOR]—has been worked out for the S.6 B and may amount to as much as 42.25 ft./sec., or a mean of 24.5 ft./sec. along the whole of the speed course. It will be remembered that two sets of flights were made for the speed record, the second being considerably faster than the first. The Report states that from the film records it has been calculated that the real level speeds of the seaplane on the two occasions were 373 m.p.h. and 390 m.p.h. respectively.

Interference.—The Interference Panel held two meetings during the year. At the first it discussed proposals put forward by aircraft firms for wind tunnel researches on the mutual interference of airscrews, bodies and wings. Researches on idealised shapes have been carried out and the results collected into a monograph on interference (R. & M. 1480). A series of new tests will be begun shortly on models of more practical interest to designers, including two types of body to represent the open cockpit and the cabin type. These tests will be carried out in the Duplex tunnel to enable them to include tests with airscrews running. The committee considers that interference problems which apply to particular designs can best be attacked by visual methods of detecting unsteady flow (wool tufts attached to the surfaces). In the general interference research experiments with airscrew present indicated a quantitative change, but qualitatively there was no important modification. The low tangential wing position was still the worst of those tested.

Landing and Taking Off.—A question raised by the aircraft industry was why some aircraft appeared to " float " a considerable distance just clear of the ground before touching, while others seemed to alight in a very much shorter distance. After consideration by the Aeronautics Sub-committee it was concluded that there was nothing in these differences which could not be explained by existing theory and from a knowledge of the aerodynamic characteristics of the machines.

In this connection the experience of an R.A.F. officer in the 1931 South African flight is of interest. Although able to take off, he experienced trouble in climbing from a few feet off the ground to 200-300 ft. altitude. Above that height the rate of climb became normal again. Dr. Simpson has provided some information which, it is thought, may be relevant. It appears that at the aerodrome at Ismailia a temperature lapse rate considerably in excess of the dry adiabatic frequently occurs. By 8 a.m. this super-adiabatic lapse rate is generally well established. The aerodrome at Ismailia is situated at approximately the same latitude as the aerodrome in question. The sub-committee has asked for a few test flights to be made in order to discover if the super-adiabatic lapse rate can affect the power required for flight.

Seaplanes

Although the modern British seaplane does not suffer from the vice of " porpoising " to anything like the same extent as was the case in the earlier days, there is still room for improvement, and as the model still forms the most convenient means of tests, it is becoming very necessary that the models used should be truly representative of the full-size machines. The new Seaplane Testing Tank at the R.A.E. will be used for tests on aerodynamically correct models, complete with wings and control surfaces, and free to porpoise during their run. Calculations of stability are at present based upon rather crude data, but they suggest that, provided the ratio of the mass to the moment of inertia is correct, the porpoising characteristics of the seaplane hull will be predicted correctly.

Last year the water resistance of a " Singapore II " hull was measured by attaching a large-scale model of the hull as a single central float to a " Moth." The Committee has now recommended that the modified " Singapore II " hull should be similarly tested in large model form.

Structures

In view of the use of thin metal sheet for aircraft construction, the types of failure of panels are being investigated. The Bristol Aeroplane Co., Ltd., has collaborated in the work of designing and testing a large cylindrical test specimen. Special test specimens have also been prepared and tested at the R.A.E. At the N.P.L. the main object has been the development of reliable theoretical methods for the determination of the strength of structure built up from thin sheet metal. In the first instance some experiments are being made on the collapse (as distinct from buckling) of rectangular thin sheets, all four edges of which are clamped. In America similar tests were made on thin sheet panels, but the edges were simply supported. The purpose of the N.P.L. tests is to determine whether the approximate theoretical analysis that has been applied to the results of the American work can be adapted to the more practicable case of the panel with all four edges clamped. As a result of these tests it is hoped to determine the critical strain which such panels will support without collapse. It is then considered that if the stiffeners are designed to support the same critical strain without buckling, the behaviour of the stiffened construction will be determinable.

Methods for calculating wing stiffness have been developed at the R.A.E., and in particular the effect of the wing ribs on wing stiffness has been studied. It has been shown that the ribs which are most effective in strengthening a wing in torsion are those near the wing tip, and it is considered probable that the low degree of torsional stiffness frequently associated with large, two-spar, fabric-covered monoplane wings might, by the suitable proportioning of the ribs, be considerably increased.

A theory of the loss of lateral control due to wing twisting has been produced at the R.A.E., based on the behaviour of " semi-rigid " wings, together with a method of finding, by a process of successive approximations, the reversal of control speed for an elastic wing. The Committee is of opinion that satisfactory methods are now available for the calculation of the critical " aileron reversal " speed of any aircraft of normal type, provided that the necessary elastic and aerodynamic data are available. It is also believed that these methods can be extended without much difficulty to aircraft of special types, such as those having multi-spar wings, or wings with stiff covering.

The Report refers to some tests on the welding of chromium-molybdenum steel. No serious difficulty was experienced in producing welds in this steel by using welding rods either of the same material or of iron, although the welding operation was somewhat more difficult than with low carbon and low carbon-manganese steels. One disadvantage appears to be due to the air-hardening properties of chromium-molybdenum steels, which result in considerable variation of hardness near the weld. It appears that the carbon content of these steels is also critical, a small change giving in some instances a relatively large change in maximum tensile strength, in both welded and unwelded samples.

Engines

Last year it was pointed out that the production of still lighter petrol engines depended mainly on improvements in detail, but that much remained to be done in promoting fuel economy, especially under cruising conditions. Following the development at the R.A.E. of a device for the automatic control of fuel-air mixtures, recent investigations have provided results of outstanding interest. It has been shown that it is possible to reduce fuel consumption at the reduced power required for cruising to a figure very substantially below anything attained in flight hitherto. The consumption of a Bristol " Jupiter " VIII F. engine in a Westland " Wapiti " aeroplane has been measured by means of a flow meter in level flight at a series of ignition settings from 36 deg. to 51 deg. advance. The tests were restricted to one height (5,000 ft.) and to " weak mixture " conditions obtained by opening the mixture control until the revolutions dropped by 3 per cent. There was a progressive gain as the ignition was advanced from 36 deg. to 51 deg. The magnitude of the gain at the most economical speed was about 7 per cent. No gain in economy was obtained by opening the mixture control after the revolutions had dropped 3 per cent. The results agree qualitatively with bench tests at the R.A.E., but the magnitude of the changes was greater in the flight tests than in the bench tests.

Research on heavily supercharged single-cylinder units has been continued. In the case of petrol engines it has been shown that the indicated power increases practically proportionally to the degree of supercharging up to initial pressures as high as three times the normal pressure. It has been found, however, that whereas at ordinary pressures it is possible to get satisfactory combustion of weak

mixtures of petrol and air, the effect of supercharging is to narrow the practical range of mixture strength. Apart from the loss of economy to be expected in a supercharged engine by reason of the necessary lowering of compression ratio, and from having to drive its own supercharger, it appears that definite limitations to the degree of supercharging in practice may be imposed by difficulties of combustion rather than by mechanical considerations.

When compression-ignition engines are supercharged, the indicated power does not increase in proportion with the initial pressure. This difficulty is not likely to be overcome by improvements in design, and it is not, therefore, considered that the production of light compression-ignition engines will be facilitated by heavy supercharging. A moderate degree of supercharge has, however, many advantages. The Committee holds the view that the development of the two-stroke compression-ignition engine holds out the greatest promise of success in the production of a satisfactory power unit sufficiently light to compete with the petrol engine.

During recent years a satisfactory form of flame trap has been developed at the R.A.E. to prevent back-fires from the engine sending flames down the induction pipes. These flame traps are made of thin sheet metal which divides the pipe into a large number of passages sufficiently small to cool and damp out any flame travelling along the pipe. In view of successful tests over many hours on the test bench and in the air, the Accidents Sub-Committee has amended its recommendation, made some years ago, that air intakes should preferably be placed outside the fuselage of an aeroplane. It is now suggested that with a satisfactory flame trap the air intakes may safely be placed inside the fuselage.

Noise

The Report is not very encouraging on the subject of aircraft noise. Reference is made to a paper by Dr. A. H. Davis in which figures of noise levels are given for exhaust, engine clatter, and airscrews. It is also mentioned that Rolls-Royce, Ltd., have made experiments on exhaust silencers, but the general conclusion is reached that unless airscrew noise can be substantially reduced, it is not of importance to proceed to extremes in silencing the engine exhaust.

LARGE AUSTRALIAN AIR SURVEY CONTRACT

THE name of Maj. H. Hemming is well known to our readers in connection with air-survey enterprises in many parts of the world. He is definitely one of the pioneers of air-survey work. Together with Maj. Cochran-Patrick he was responsible, many years ago, for surveying the Orinoco Delta. Later on, with the Air Operating Co., of which Mr. Alan Butler is the Chairman, he carried through large survey contracts in Brazil, Rhodesia and other parts of the world, but so far he has not had the opportunity of working on Australian development.

A large contract which he recently secured will, however, remedy that defect, as Austral Development, Ltd., acting on behalf of the Western Mining Corporation, Ltd., have appointed H. Hemming and Partners as Managing Contractors for the survey of a very large area in the gold-mining districts of Western Australia.

This application of aerial photography to geological prospecting will enable the work to be carried out at far greater speed than could be done with ground survey only. A further point which will help the work to be done quickly and accurately is the method by which the survey aircraft will be controlled from ground wireless stations. The area under survey extends over 1,200 miles of country, and the total area to be photographed may well be in the region of 88,000 sq. miles.

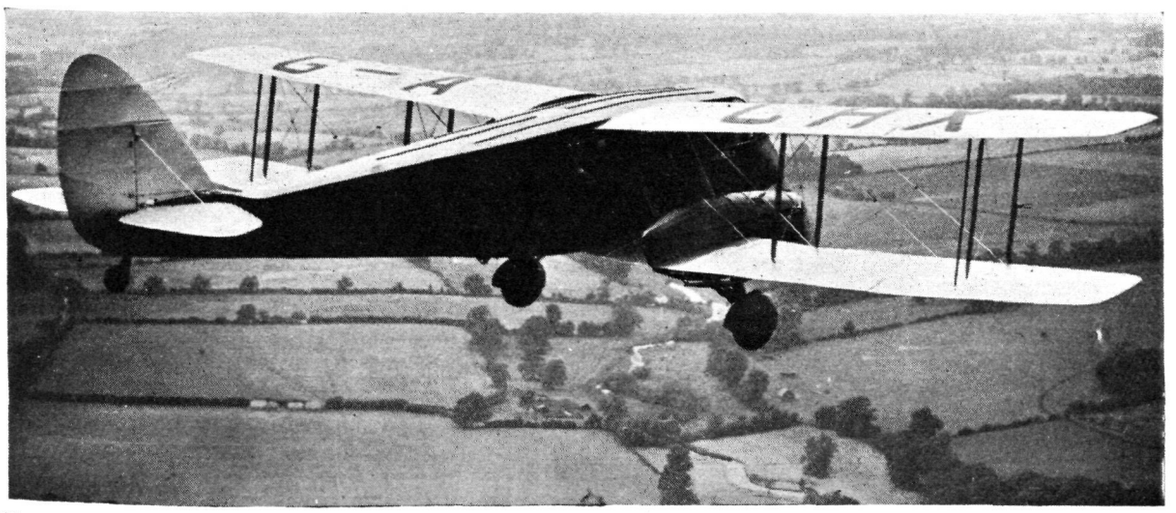
The contract, relating to the rights for this survey obtained from the Government of Western Australia, calls for the use of the most modern methods, and in this connection it is interesting to find that the aeroplanes will be D.H. "Dragons" (two "Gipsy Majors"), and the cameras will be those well-known "Eagle" type, made by the Williamson Manufacturing Co.

For a geological survey to use aerial methods satisfactorily, it must be carried out with the co-operation of a ground staff, and can only be the basis upon which the geologists on the ground can work. It does, however, save them an enormous amount of time, and shows up faults, outcrops, and other features upon which they can base their ground operations. The ground work will be done by the geologists and surveyors of the Western Mining Corporation, who will also provide the wireless operators and crews of the ground stations which will work with the aeroplanes during survey flights.

Wing Com. F. V. Laws, at present Commandant of the School of Photography, who is retiring from the R.A.F., will be manager of the expedition; and Admiral Sir Percy Douglas, who has until recently been hydrographer of the Navy, will advise on the ground survey part of the operations. H. Hemming and Partners will also train local staff in air-survey methods, as it is the Mining Corporation's wish that, eventually, the entire staff should be Australian.

Capt. C. W. Snook, whom, as we were able to announce not long ago, has been on a visit to this country in connection with the flying equipment of the company, will be chief pilot, and he will have as one of his assistants Flt. Lt. S. C. Campbell, who piloted the seaplane used on the Sir Douglas Mawson expedition to the Antarctic. Flying operations are expected to start early next year.

The Directors of the Western Mining Corporation, Ltd., are Messrs. Colin Fraser, W. S. Robinson, M. L. Baillieu, and Lindesay Clark, and its Share Capital is owned largely by North Broken Hill, Ltd., South Broken Hill, Ltd., Zinc Corporation, Ltd., Electrolytic Zinc Co. of Australasia, Imperial Smelting Corporation, Central Mining & Investment Corporation, Case, Pomeroy & Co., Union Corporation, and New Consolidated Goldfields.



Chosen as the most suitable machine, a D.H. "Dragon" of the type to be used on air survey in Australia. Its clear outlook forward makes it ideal for the purpose. This particular machine is run on private charter work by Wrighton & Pearse at Heston, and was recently hired by the Prince of Wales. (FLIGHT *Photo.*)

Airport News

CROYDON

THE list of well-known people passing through the Airport of London last week reached a quite formidable length. On Wednesday Gen. Smuts left by Imperial Airways, homeward bound for South Africa. He was bidden farewell by Mr. N. M. Butler, representing the Prime Minister, Sir Edward Harding for the Dominions Office, and Mr. Bertram of the Air Ministry. Gen. Smuts recognised as an old friend Constable Kennedy, now of the airport police, who 31 years ago was a trumpeter at the Vereeningen Peace Conference, South Africa. Regular frequenters of the airport will know Constable Kennedy's famous black wall-eyed dog which is on duty whenever he is. He brought the dog home from "Mespot," and it is said to be half jackal.

On Thursday, by the 1.15 p.m. Scandinavian Air Express, H.R.H. Princess Ingrid of Sweden travelled home after her annual visit to this country. Thursday was an ideal flying day, and, as Princess Ingrid remarked, continued her unbroken record of "lucky" flying weather. She was seen off by Princess Helena Victoria and Lady Patricia Ramsay.

Amongst other well known travellers were Mr. Gordon Selfridge to and from Berck by Air Union, Steve Donoghue by Sabena to Ostend, where he rode in the Grand Prix d'Ostende. For this event Sabena had extremely heavy bookings, and were obliged to supplement the regular service with five extra machines in three days.

Imperial Airways probably broke all records for well known travellers on a single aeroplane when, on one of their inward aeroplanes from Paris, the passenger list included the names of Mrs. Rosita Forbes, the two Fairbanks (father and son), Werner Krauss, the German singer, and Sir Percy Lorraine.

Thursday saw the inauguration of a Croydon-Plymouth service operated by a company called International Air Lines, Ltd. Maj. F. L. Richard christened one of the "Monospars," which are to be used, by the name of "Sir Francis Drake."

Now that almost every firm connected with air travel or taxi-work has its representatives in uniform the time is perhaps ripe to mention that uniforms are not primarily intended to be worn in the evenings in local taverns and cinemas. It is also to be regretted when a company chooses a uniform practically indistinguishable from that of Imperial Airways, Ltd., and possibly it is a matter for the consideration of the Guild of Air Pilots and Navigators when members of the ground executive wear gold pilots' "wings" on uniforms.

Reputable companies have striven to make the commercial air company's uniform a symbol of efficiency and good organisation, equal in every respect to that of the higher grade Merchant Service officer. The standard should on no account be lowered.

Some of the French aeroplanes in and out of Croydon have already appeared with the new title "Air-France" painted on them.

I hear that the French "Golden Clipper" machines are maintaining a steady average of 1 hr. 31 min., and that this particular type is always fully booked up.

Imperial Airways bookings to and from Paris, according to their officials, have increased rather than decreased since the "Golden Clippers" were placed on the Paris line. You cannot have it both ways, and it remains to be seen which the travelling public prefers, an extra turn of speed or the perfect comfort and service given to the traveller by the large "pullman" planes of the British company. According to Air Union, K.L.M. and Sabena officials, a gratifying feature of this summer's bookings has been the large increase of passengers to such places as Scandinavia, Marseilles, Prague, Vienna, and, in fact, in all far distant places which can now be reached in a single day's flying.

"A. VIATOR."

FROM HESTON

ONE of the 5.A.T. Ford aircraft is at present in the Heston workshops undergoing slight modifications which will enable it to obtain validation of its commercial C. of A.

The British Air Navigation Co. were booked up for the week-end of August 25-28 to the full capacity of their pilots and machines, mainly for Deauville and Le Touquet. During the previous week-end they made no less than seven trips to Deauville and back and four to Le Touquet.

Newcomers to Heston in the private charter business are the firm of Wrightson & Pearse. They specialise in large charters, and their green "Dragon" *Lucretius* is already a familiar sight around London. Their first customer (some time ago) was H.R.H. the Prince of Wales, who chartered a machine for the opening of a hospital in Suffolk. On Saturday, August 26, they took Mr. Steve Donoghue and a party of jockeys to Eastbourne, and then on to Belgium for another meeting.

On Saturday the night watchmen dealt with a rush telephone booking for the early morning Spartan service to Ryde. The passenger was Dr. Ashwin, who attended an urgent operation in Shanklin and returned to London the same day. The day after he made the same journey by air to see how the patient was progressing.

The Airport Hotel has been full for the last week, and resident staff have been shifted round to make room for visitors. Mr. Hay and his mother, members of the Yorkshire Aeroplane Club, who make a point of staying the night at Heston before any trip abroad, were among the visitors. They are flying out to Budapest with Mr. Garnett in two "Puss Moths," and will take part in the Austrian Rally, flying from the requisite distance of 300 miles. Mrs. Cleaver, who has been flying all round Scotland, touching at Glasgow, Inverness, Edinburgh and Wick, among other places, arrived back at Heston this week. On Monday, the 28th, she is expecting to take delivery of her new "Gull," which is the first of its kind to be fitted with dual control. Mr. Durrant Campbell (whose mother is known for her enterprising Mediterranean tour in a Sikorsky) arrived home this week after touring France in his "Gull." Mr. R. L'Estrange Malone left on the 25th for Dusseldorf, where he dropped his passenger, Herr Rebling, a very well-known German pianist, who has been fixing up concerts in England. On his return, Mr. Malone brought Herr Brengs, a German war pilot, home with him from Cologne. Mr. Edwin Freshfield accompanied him in another machine.

Miss Heather Thatcher lunched at Heston on Tuesday, the 22nd.

Lt. Com. F. G. L. Bullock, R.N., and his wife (*née* Miss Eve Milner) left Heston for Le Touquet in a Norman Edgar "Fox Moth" on Tuesday, August 22, after their marriage at Brompton Oratory.

During the week ending August 24, 44 machines cleared Customs at Heston.

The Comrades of the Royal Air Force held a very successful flying garden party at Heston Verandah on Sunday, the 20th. Capt. Baker, Mr. Tangye and Mr. Draper gave aerobatic exhibitions, while Wrightson & Pearse took 115 people for paying joyrides and Mr. Draper (an "A" and not a "B" pilot) was kind enough to give a number of non-paying rides to the "Comrades" themselves. Mr. Brie gave demonstrations and joyrides on the "Autogiro." Sideshows included a treasure hunt for two flight tickets, and many people were shown round the aerodrome and the works of Airwork Engine Service, Ltd.

Save time by using the Air Mail.

THE NEW BMW Xa LIGHT PLANE ENGINE 54/60 H.P.

THE Bayerische Motoren Werke of Munich have now gone into production with a small five-cylinder radial engine developing a normal maximum of 60 h.p. at 2,050 r.p.m. and a continuous output of 54 h.p. at 1,980 r.p.m., while the absolute maximum (for short periods only) is 68 h.p. at 2,300 r.p.m. Already in 1929 the company started work on an engine of this size and kind, and in 1930 the BMW X was brought out, which proved quite capable of sustained heavy service but yet did not quite satisfy the makers. These have in the meantime gained wide experience with radial air-cooled engines through being licensees of Pratt & Whitney, whose "Hornet" the B.M.W. company has introduced with considerable success in Germany. This experience has been incorporated in the new small BMW Xa, which, among other features, has lead-bronze bearings for the divided crankshaft and the master-connecting rod, and a very small diameter at only 29.05 inches (738 mm.), the total length with hub measuring also only 26.13 inches (664 mm.).

The crankcase consists of five separate Elektron castings. Steel cylinder barrels with flanged-on light metal alloy heads, which are cast integral with the streamline rocker casings, are employed. Aluminium pistons have two compression and one oil scraper ring. The piston on the master rod has a stroke of 3.54 in. (90 mm.), which also is the bore of all cylinders, while the pistons on the auxiliary rods have a stroke of 3.64 in. (92.5 mm.). There are two valves for each cylinder operated in the usual manner by enclosed pushrods and rockers. Aluminium-bronze valve seats are shrunk in and flanged over. The valve guides are of bronze and two co-axial coil springs are fitted for each valve. Dual ignition by two Bosch magnetos with automatic spark control is furnished.

The compression ratio is 5.7 to 1. The engine has proved very economical and does not consume more than 0.52 lb. per h.p.-hour at maximum constant output of 54 h.p. A Sum carburettor type CFV 36 is employed. The engine has completed the full official type tests without a single fault and has fulfilled the Cina conditions so that it is qualified for public use. It weighs 160.6 lb.

E. P. A. H.

NEW IRVIN PARACHUTE HARNESS

A SUCCESSFUL test with a new type of Irvin parachute harness was made by Mr. John Tranum on August 15 at the Irving Company's aerodrome near Baldock, Herts. The new harness, which has been designed by Mr. Leslie Irvin after considerable experimenting, embodies almost 100 per cent. self-adjustment, and has no straps to pass between the legs as in the case of the conventional type, which at once stamps the equipment as most suitable for women air passengers, and very easy to put on.

The passenger sits in the new harness as in a swing, and when the parachute opens the straps automatically adjust themselves to the passenger. It is simple to modify a parachute harness for ease in attachment to the body, but the important question that results is how will the modification react when a jump is made.

Obviously one cannot delete a strap here or a strap there for comfort's sake if it is going to create insecurity in action. Consequently the successful test with Mr. Irvin's new harness has proved that simplicity and comfort have been introduced with perfect safety.

Tranum dropped out of a "Puss Moth," owned and flown by Mr. Irvin, at 1,200 ft. In this machine the doors have been arranged so that they can be dropped off in case of an emergency, and on this occasion one door was left off to provide a ready exit. Without intention in this test Tranum incidentally showed how quickly the new harness fitted on when he got into his seat.

A seat pack is used with this harness and the latter can be almost completely hidden in the upholstery of the chair, and need not be worn during flight. To attach the equipment to himself the passenger simply moves two short pieces of webbing in the harness across his lap and tightens them with a slight pull. Then he naturally eases his shoulders in shoulder straps in position at the top of the chair, and makes a connection in front. The harness is on.

In designing this harness Mr. Irvin has been faithful to the factor that he has followed in his previous harness designs, namely, that the opening shock of a parachute must be distributed over the body, and to obtain this effect the parachutist must sit in a swing which must be held in position so that he does not fall through. It is then essential to provide straps across the back and front to prevent a fall backwards or forwards. Further, the point of suspension should be at the shoulders. These features have been retained in the new harness without the need of adjustment according to the size of the wearer, and without leg straps.

Book Reviews

"Hot Air in Cold Blood," by Brig. Gen. Guy Livingstone, C.M.G. (Selwyn and Blount (1928), Ltd.) Obtainable from FLIGHT *Office, 18s. 9d. post free.*

A book which contains an epigraph in the form of an exhortation to the Deity that He may defend us from Puerile Politicians, International Financiers, and Theoretical Experts, stamps the author as an egotistical being with a natural desire for destructive criticism which, although it is excellent self-advertisement, is of no real ultimate value. Brig. Gen. Guy Livingstone, C.M.G., who was at one time Director of Air Organisation at the War Office, and later Deputy-Master-General of Personnel at the Air Ministry, has recorded, in a book with the excellent title "Hot Air in Cold Blood," a report of his connections with the Fighting Forces of Great Britain. The opening paragraph informs the reader that at a very early age the author developed an urge to serve his country in either the Navy or the Army. His connection with the Navy never got beyond the stage of intention, in the Territorial Force he must have been a thorn in the side of those in high authority, and when eventually he became connected with the Air Ministry the very walls of the building must have trembled at the sound of his footsteps. From the repeated appearance in the book of the ninth letter of the alphabet as a whole word it would appear that the early urge to serve his country developed into a conviction that this could best be done by a studied belief in his own infallibility. Nevertheless Brig. Gen. Livingstone must have possessed a very vigorous personality capable of getting things done efficiently and quickly. For a Territorial officer to have risen to the rank of Brig. Gen. and to have held such appointments as he did is no mean achievement.

To those who delight in destructive criticism, mistaking it for the brilliancy of genius, and there are many such nowadays, the book will be welcome. The author writes in an exhilarating style very pleasant and easy to read, and he gives some delightfully amusing, and very interesting, sidelights into the workings of Government departments during the war. He also professes to expose much petty jealousy and intrigue, which must be exaggerated, for even the author himself admits, and the book clearly illustrates, the wonderful work which was done during the war. Standing out above all is the vigour, perseverance, and unwavering belief in the power of Air Armament, shown by those responsible for the formation and building up of the Royal Air Force.

"Silhouettes of Royal Air Force Aircraft" (Air Publication 1480). (Published by H.M. Stationery Office.) 1s. 3d. net.

This little publication should be very popular, for there are many people nowadays who want to be able to recognise every aeroplane which flies over their heads. Four silhouettes are given of every type now in use in the R.A.F., namely three-quarter front, full front, overhead plan, and sideways views. All machines are shown to the same scale. The caption gives the span, length, and height of the machine, and mentions the name of the engine. The introduction states that practice will enable observers to differentiate between the exhaust notes of different types of engine.

The machines are arranged in seven classes, (1) single-seater and two-seater fighters, (2) Bombers single-engined, torpedo-planes, and general purpose, (3) Bombers multi-engined, (4) Army co-operation, (5) Fleet Spotter Reconnaissance and Fighter Reconnaissance, (6) Coastal Reconnaissance, and (7) Transport and Communication The volume is loose-leaved, so that subsequent additions can be made.

As certain very similar types are used for different purposes in the R.A.F., it is perhaps natural that certain inconsistencies should be apparent in this little book. The differences between the "Hart," "Osprey," and "Audax" can be clearly discerned in the silhouettes, and further information about them is given in the dimensions printed below, but the "Demon" is not included in the volume. The "Wapiti" is entered as "general purpose," and is not shown equipped as an army co-operation machine, though it is used for that purpose in India. The fin and rudder of the "Seal" do not seem in the silhouette to be those of the latest model. Presumably this book will be of most use to the Observer Corps, and we think that it would be easier for them to use if some notes were added warning them of the resemblance between "Hart," "Audaxes," and "Ospreys," and also giving them some information about the "Demon." Otherwise the book seems to be complete, and it should find customers outside the ranks of the Service and of the Observer Corps.

A SIMMONDS-CORSEY CONTROL DEVELOPMENT

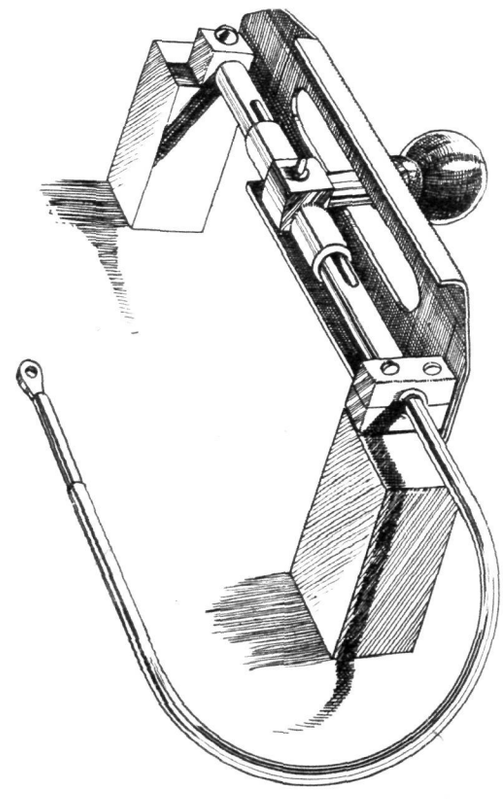
A MOST interesting and valuable development of the Simmonds-Corsey Control is the new cockpit sliding lever for engine controls. The average cockpit lever is by no means an attractive article, especially in small saloon aircraft, whilst every aircraft designer must have been troubled by the difficulties of converting the linear motion of the pilot's hand into a rotational movement of the lever and thence once again into the linear action of the interconnection links.

The Simmonds Sliding Lever fits over the casing tube of the control and slides most sweetly along it. The casing tube has a longitudinal slot through which the lever is pinned on to the internal Simmonds-Corsey linkage In the lever itself there is an easily adjustable friction pad which can be modified by turning the knob. A simple locking device is provided. Any offset load applied by the pilot is taken on the cover plate, which has a slot through which the lever protrudes. This also gives a most attractively neat finish to the whole installation.

The mounting of the cockpit control in the aircraft is effected by standard bolts through rigid type casing clips, and in multi-engined machines all the controls can be mounted on the fixing bolts by means of suitable distance tubes.

The whole unit is lighter, simpler and more economical than the old type of rotating lever, and a number of aircraft manufacturers have already decided to fit it.

The increasing demand for Simmonds-Corsey Controls is well illustrated by the fact that current orders necessitate half a million olives and tubelets.



THE ROYAL AIR FORCE

London Gazette, August 22, 1933.

General Duties Branch

Lt.-Com. G. C. Dickins, R.N., is reattached to R.A.F. as a Flt.-Lt., with effect from August 8 and with seny. of January 1; Lt. A. C. G. Ermen, R.N., is reattached to R.A.F. as a Flt.-Lt., with effect from August 8 and with seny. of July 1; Lt. H. A. Traill, R.N., is reattached to R.A.F. as a Flt.-Lt., with effect from August 15 and with seny. of January 1; Lt. C. A. Kingsley-Rowe, R.N., F/O., R.A.F., ceases to be attached to R.A.F., with effect from July 16, on return to Naval duty, and is reattached to R.A.F. as a F/O. with effect from August 10 and with seny. of April 19, 1927; Lt. D. G. F. W. Macintyre, R.N., F/O., R.A.F., ceases to be attached to R.A.F. on return to Naval duty (August 15); P/O. P. I. Harris is promoted to rank of F/O. (July 28); Sqdn.-Ldr. R. M. Trevethan, M.C., is restored to full pay from half pay (August 11); Wing-Com. C. G. S. Gould is placed on retired list at his own request (July 8); Flt.-Lt. F. C. Farrington, M.C. (Lt., Royal Artillery, R.A.R.O.), is transferred to Reserve, Class A (August 20); F/O. D. L. Iremonger takes rank and precedence as if his appointment as F/O. bore date December 29, 1930. Reduction takes effect from January 6.

ROYAL AIR FORCE RESERVE

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. P/Os. are promoted to rank of F/O.:—W. S. Coates (February 17); F. U. Hollins (March 15); W. T. Taylor (June 17).

The follg. are transferred from Class A to Class C:—Flt.-Lt. M. C. Dudding (July 15); F/O. E. C. H. Clarke (August 21).

F/O. E. F. Rhodes is transferred from Class C to Class AA (ii) (June 19); F/O. R. Edwards is transferred from Class AA (ii) to Class C (July 22); the commn. of P/O. on probation N. M. E. Highton is terminated on cessation of duty (July 29); P/O. A. D. Moore relinquishes his commn. on completion of service (July 10).

AUXILIARY AIR FORCE

General Duties Branch

No. 605 (County of Warwick) (Bomber) Squadron.—R. G. Grant-Ferris is granted a commn. as P/O. (July 29).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Stores Branch

Wing Commander B. W. M. Williams to Home Aircraft Depot, Henlow, 15.8.33, for Stores duties.

Squadron Leaders: P. H. Cummings, D.F.C., to Central Flying School, Wittering, 12.8.33, for Administrative duties vice Wing Com. G. E. Livock, D.F.C., A.F.C. R. M. Trevethan, M.C., to No. 99 (B) Sqn., Upper Heyford, 11.8.33, for Flying Duties vice Wing Com. A. S. Maskell. E. S. Goodwin, A.F.C., to Air Ministry, Dept. of Chief of the Air Staff (D.O.S.D.), 11.8.33, for Air Staff duties vice Flt. Lt. C. H. A. Stevens.

Flight Lieutenants: R. L. R. Atcherley to H.Q., R.A.F., Middle East, Cairo, 25.7.33. A. F. Britton to Station H.Q., Netheravon, 9.8.33. W. G. H. Ewing to Station H.Q., Andover, 9.8.33. J. A. S. Outhwaite to No. 1 School of Tech. Training (Apprentices), Halton, 9.8.33. J. A. T. Ryde to No. 801 (F.F.) Sqdn., 30.6.33. H. J. Young to H.M.S. *Courageous*, 15.8.33.

Flying Officers: C. R. Davies to No. 2 Aircraft Storage Unit, Cardington, 28.7.33. H. E. Dicken to Reception Depot, West Drayton, 9.8.33. O. I. Gilson to Marine Aircraft Experiment Estab., Felixstowe, 9.8.33. C. V. Howes to School of Tech. Training (Men), Manston, 9.8.33. H. C. Jordan to R.A.F. Base, Calshot, 9.8.33. M. V. Delap to R.A.F. Base, Gosport, 9.8.33. A. M. Rodgers to No. 16 (A.C.) Sqdn., Old Sarum, 10.8.33. W. N. H. Banks to No. 6 (B) Sqdn., Ismailia, 1.8.33. V. S. Bowling to No. 5 Flying Training School, Sealand, 9.8.33. E. D. Elliott to R.A.F. College, Cranwell, 9.8.33. W. H. Jones to No. 33 (B) Sqdn., Bicester, 9.8.33. C. L. Gilbert to Record Office, Ruislip, 12.8.33.

Pilot Officers: H. M. Russell to No. 26 (A.C.) Sqdn., Catterick, 1.8.33. N. H. J. Tindal to No. 26 (A.C.) Sqdn., Catterick, 1.8.33. Hon. E. F. Ward to No. 811 (F.T.B.) Sqdn., 11.8.33. R. G. Bowditch to No. 26 (A.C.) Sqdn., Catterick, 2.8.33. C. H. E. Lyster to Aeroplane and Armament Experimental Estabt., Martlesham Heath, 14.8.33. E. J. Smith to Station H.Q., Upper Heyford, 14.8.33. D. Stephenson to Station H.Q., Worthy Down, 14.8.33. D. F. Syder to Station H.Q., North Weald, 14.8.33.

Acting Pilot Officer C. F. S. Fraser to No. 47 (B) Sqdn., Khartoum, 23.7.33.

Accountant Branch

Flight Lieutenant R. W. L. Glenn to Station H.Q., Amman, 11.8.33.

NAVAL APPOINTMENT

The following appointment has been made by the Admiralty:—

Promotions

Lieut. C. R. V. Pugh (*Flt. Lt., R.A.F.*), to rank of Lt. Com. (seny. Aug. 15).

The Sassoon Photographic Challenge Trophy

The entries for the photographic trophy presented by the Right Hon. Sir Philip A. G. D. Sassoon, Bart., G.B.E., C.M.G., M.P., Under-Secretary of State for Air, have now been judged. Eleven units entered for the competition, and the final placing and marks awarded are as follows:—

	Per cent.
1. Andover	87·6
2. Bicester	87·3
3. Farnborough, No. 4 (A.C.) Sqdn.	86·9
4. Bircham Newton, No. 35 (B) Sqdn.	80·5
5. Catterick	80·2
6. Old Sarum	76·6
7. Manston	73·8
8. Bircham Newton, No. 207 (B) Sqdn.	63·4
9. Upper Heyford	46·0
10. Abingdon	45·8
11. Boscombe Down	45·7

The flying and technical photographic work were generally good. The speed with which the mosaics were produced was also generally satisfactory, although in a few cases long delays occurred. In some cases, in mounting the mosaics, irregular cutting of the prints was employed. The standard method of mounting with square-cut prints should be adhered to in order to preserve detail of intelligence value.

The competition aroused considerable interest among the units, and the judging has provided invaluable information as to the standard of work produced by the various squadrons.

No. 24 (Communications) Squadron at Hendon

A recent Air Ministry Order is amended as follows: "No. 24 (C) Squadron at Hendon will be responsible for providing flying facilities for the Air Ministry, Headquarters Inland Area, No. 1 Air Defence Group, No. 1 Stores Depot, Hendon Station Headquarters, Superintendent of Reserve, and officers attached for special duties or undergoing courses in the London area. The detached flight at Northolt will be responsible for providing similar facilities for Headquarters Air Defence of Great Britain, Headquarters Fighting Area, No. 21 Group, Reception Depot, R.A.F. Depot, Record Office, No. 4 Stores Depot, and Station Headquarters, Northolt."

Calshot Reunion Dinner

It is proposed that a Calshot reunion dinner shall be held at the R.A.F. Club, 128, Piccadilly, W.1, on Friday, December 8, 1933. Dress, dinner jackets. Applications for tickets (12*s.* 6*d.* each), accompanied by remittance, should be addressed to Wing Commander H. E. M. Watkins (Retired), R.A.F. Base, Calshot.

FRANCE TO ENCOURAGE ULTRA-LIGHT PLANE

PRIVATE flying in France is likely to receive a considerable stimulus from the recent decision of M. Pierre Cot, the French Air Minister, to grant a State subsidy to purchasers of single-seater light planes. This is an extension of the system in force in France at the present time of subsidising purchasers of two-seater light planes. The system differs fundamentally from that adopted in this country for subsidising light aeroplane clubs, and it is interesting, therefore, to examine it a little more closely.

As most of our readers will know, France has for some years been granting State aid to owners of light aeroplanes by paying a certain percentage of the purchase price. Hitherto ultra-light aeroplanes have not been included in this scheme, but M. Pierre Cot has become convinced that encouragement of this type of aeroplane is likely to make for increased air-mindedness, and has now added the low-power single-seater to the types eligible for State assistance.

The new subsidy is for aeroplanes fitted with engines of not more than 50 h.p., and in addition to having the usual certificate of air-worthiness in the "normal" class, the machine must be able to clear an obstacle 8 m. high in a distance of 250 m. from the start. The machine must be capable of carrying 90 kg. (200 lb.) of useful load (pilot and parachute), and fuel sufficient for at least 2½ hours' flying at nine-tenths of full power.

Presumably, in order to guard against the relatively inexperienced and insufficiently financed constructor, there is a stipulation that a type will not be eligible for the subsidy unless the constructor can show orders for at least 20 machines. Insurance by the purchasers is also insisted upon. For the rest of 1933 only two batches of 20 machines, that is 40 in all, will be awarded the subsidy.

And now for the real plum. The purchase price of a machine must not exceed 20,000 francs. If it is below this figure, the State subsidy granted will be 7,000 francs, or just over one-third the price, so that a private owner will be able to get an aeroplane for 13,000 francs. This represents £105 at par, and £154 at the present rate of exchange.

It now only remains for a French constructor to produce a machine to sell at this low price.

BRIEFLY

MR. K. WALLER, who flew his "Moth" ("Gipsy I") into first place at Folkestone on August 26, used Pratts petrol and Speedoline oil for his engine. The second and fourth home used the same spirit.

UNTIL September 17 pilots flying near Blackpool should keep a good look-out for a captive balloon which may be flown by the R.A.F. from a position 1½ miles south of Stanley Park aerodrome and 1½ miles north of Squire's Gate aerodrome. The height of this obstruction will not exceed 500 feet and the cable will be marked in the usual manner.

IT is understood that the Percival "Gull" will be manufactured at Gravesend aerodrome.

MR. R. DENMAN, who, as we announced last week, has obtained his commercial wireless operator's licence, has permission of the Postmaster-General to carry out transmission on ultra short wave lengths with a view to testing field strengths.

K.L.M. are using variable pitch airscrews with great success. A saving of 30 per cent. in take-off run has been achieved with one design.

MR. M. P. SPENCER has severed his connection with Maidstone Aero Cub and has taken the post of Secretary-Manager of the Gravesend Aero Club.

MAJ. H. HEMMING will lecture on "Air Survey Work: Its Various Aspects and Uses," on Sunday evening, September 24, in the Wills Hall, Bristol. The lecture will be during the Tenth Annual Conference of the Association of Special Libraries and Information Bureaux being held at Bristol from September 22 to 25. Col. the Master of Sempill will be in the chair.

MISS DELPHINE REYNOLDS has just returned from a ten-days' trip in a "Redwing." During that time she never once landed in a proper aerodrome, and yet had no difficulty about taking off. This shows that the "Redwing" can be got out off any field in which it can be landed.

LIVERPOOL AIRPORT (Speke) now has regular Customs facilities for passengers.

AIRSPEED, LTD., at Portsmouth, have three more Airspeed "Couriers" under construction, the first of which will soon be flying. Sir Alan Cobham's machine of this type is ready for his attempt to fly to Australia non-stop by means of refuelling in the air, and it is expected that he will start on the flight during the early autumn. Mr. Tiltman is studying the question of a two-engined machine, but nothing has been settled yet.

THE new D.H. "Leopard Moth" can be supplied with either the normal type of "joy-stick" control or with spectacle type wheel control. The first production model recently delivered to Sir Derwent Hall-Caine has the latter type.

HESTON is now the venue for pilots from all over the world when they visit England. At lunch recently two ladies and four men could between them talk English, Spanish, French, German, Arabic and Flemish.

A PROBABLE entry for the Australian Race which is being held next year is that of Mrs. Victor Bruce in a Miles "Hawk."

THE Hampshire Aeroplane Club are likely to move to a new club-house in the near future. This will be the quarters which in years gone by were occupied by the C.O. when Eastleigh was a Service aerodrome. The building is still in a reasonable state of repair, and will make a club-house worthy of the club. The garden attached to the house has the remains of two grass tennis courts in it, and a member who is practised in such matters thinks he can resuscitate them sufficiently rapidly for play to be possible next year.

IT should be remembered by those flying to Deauville that they must clear Customs at one of the aerodromes appointed for the purpose. Berck is the nearest which has Customs facilities.

EXIDE batteries, which are so widely used in aircraft, are now being installed in the palace of the Dalai Lama, in Lhasa, the capital city of Tibet.

RUMANIAN AIRCRAFT will in future bear the registration letters YR followed by three letters. Previously their distinguishing letters were CV.

THE Junkers heavy oil engine type "Jumo" is now understood to have achieved a fuel consumption of only 0.35 lb./b.h.p. hr. during its type test at nine-tenths full power, *i.e.*, at about 680 b.h.p. Luft Hansa are said to have ordered 30 Junkers "Jumo" heavy oil engines.

VIA THEIR NATURAL MEDIUM: The Marconi agents from all over the country came to London for the Radio Exhibition at Olympia by means of D.H. "Dragons" (two "Gipsy Majors") chartered from Hillmans Airways. Here are some of them arriving at Heston Airport.

PUBLICATIONS RECEIVED

Silhouettes of the Royal Air Force Aircraft. Air Publication 1480. London: H.M. Stationery Office, W.C. 2. Price 1*s.* 3*d.* net.

Aeroplane Design. By R. Rodger. The Association of Engineering and Shipbuilding Draughtsmen. Session 1932–33. London: Draughtsman Publishing Co. Ltd. Price 6*s.* net.

Aeronautical Research Committee Report for the Year 1932–33. London: H.M. Stationery Office, W.C.2. Price 2*s.* net.

Aeronautical Research Committee Reports and Memoranda. No. 1519. *Lateral Stability of an Aeroplane beyond the Stall.* By L. W. Bryant, I. M. W. Jones and G. L. Pawsey. June, 1932. Price 1*s.* 3*d.* net. No. 1529. *Abstract: Flexural Centre and Centre of Twist of an Elastic Cylinder.* By W. J. Duncan, D. L. Ellis, and C. Scruton. April, 1933. Price 2*d.* net. No. 1534. *Spinning of High and Low Wing Monoplanes.* By H. B. Irving, H. S. Batson, and A. G. Gadd. February, 1933. Price 6*d.* net. London: H. M. Stationery Office, W.C.2.

Aeronautical Research Committee Reports and Memoranda: No. 1422. *Experiments on the Hawker "Hornbill" Biplane. Part I.* By S. B. Gates, A. Ormerod and R. A. Fairthorne. *Part II.* By A. V. Stephens. *Part III.* By H. B. Irving and A. S. Batson. August, 1932. Price 1*s.* 3*d.* net. No. 1512. *Effect of Tractor Airscrew on Body-Wing Interference.* By E. Ower, R. Warden and L. J. Jones. Nov., 1932. Price 1*s.* 9*d.* net. No. 1535. *Simplified Presentation of the Subject of Spinning of Aeroplanes.* By H. B. Irving. March, 1933. Price 1*s.* 9*d.* net. No. 1520. *Air Torque on a Cylinder Rotating in an Air Stream.* By A. Thom and S. R. Sengupta. Oct., 1932. Price 6*d.* net. No. 1536. *Effect of Stiff Ribs on Torsional Stiffness of Wings.* By H. Roxbee Cox and D. Williams. Jan., 1933. Price 1*s.* net. No. 1452. *Drag and Pressure-Distribution Experiments on Two Pairs of Streamline Bodies.* By C. N. H. Lock and F. C. Johansen. March, 1933. Price 1*s.* net. London: H.M. Stationery Office, W.C.2.

Catalogue

Collected Researches of the National Physical Laboratory. April, 1933. London: H.M. Stationery Office, Adastral House, Kingsway, W.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

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17,978. AIR SERVICE TRAINING, LTD., H. F. JENKINS and R. C. BERLYN. Mechanism for controlling an indicator device for the instruction of aircraft pilots. (396,540.)

20,858. S. B. SMITH. Variable-pitch propellers. (396,550.)

36,497. DORNIER METALLBAUTEN GES. AND C. DORNIER. Aircraft landing-gear. (396,609.)

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1,306. AKTIEBOLAGET MILO. System for driving propellers. (396,622.)

1,817. G. CAPRONI. Wings for high-speed aircraft. (396,656.)

Personals

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Married.

CONWAY : SANDERS.—On August 21, 1933, at St. Mary's Church, Abbey Road, London, N.W., very quietly, C. W. W. S. CONWAY, R.A.F., to JOAN MARIAN SANDERS.

Births.

LLOYD.—On August 22, 1933, at 17, St. Mary Abbott's Terrace, London, W., to PHYLLIS, wife of WING-COMMANDER I. T. LLOYD, R.A.F.—a daughter (BRONWEN).

Death.

MITCHELL.—At 17, Albert Road, London, N.W.1, on August 27, 1933, MAJOR ROBERT MITCHELL, C.B.E., J.P., Vice-President of the Regent Street Polytechnic. Aged 78.

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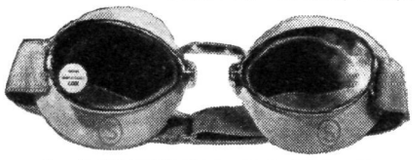

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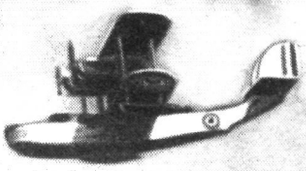

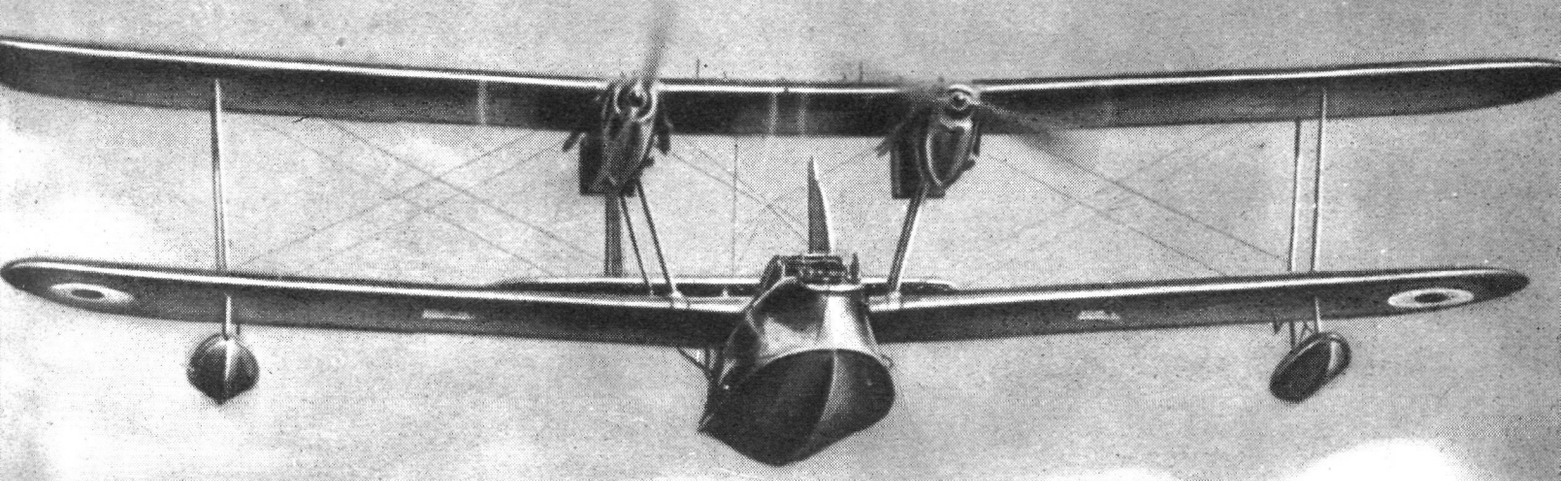

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